

# GLOBAL CLIMATE HIGHLIGHTS

## Major Climate Events and Anomalies as of March 14, 1992

### 1. Western North America:

#### MORE SPRING-LIKE CONDITIONS.

Unusually mild weather persisted across much of the region, with temperatures averaging as much as 11°C above normal in parts of west-central Canada and 7°C above normal in Montana. Arctic air was confined to the eastern half of the continent [14 weeks].

### 2. Southern United States:

#### STILL WET.

Heavy rain showers drenched parts of the South from northeastern Texas through the Tennessee Valley with 100 to 120 mm of rain. Although lesser amounts fell to the south and west, six-week moisture surpluses of 100-195 mm still covered parts of Texas [22 weeks].

### 3. East-Central South America:

#### WET WEATHER DEVELOPS.

Over 100 mm of rain inundated parts of Paraguay as wet conditions overspread the region. Scattered rainfall surpluses of 100 to 200 mm have accumulated during the past few weeks [4 weeks].

### 4. Southern South America:

#### LATE SUMMER HEAT WAVE.

Unusually high temperatures developed in Argentina, Uruguay, and Chile during the past two weeks. Departures reached up to +8°C in parts of Argentina, and readings soared as high as 37°C [2 weeks].

### 5. Southern Europe:

#### DRYNESS PERSISTS.

Spotty precipitation of up to 30 mm was recorded at a few stations, but totals were generally below ten mm at most locations. Moisture deficits since early February ranged between 100 and 200 mm in parts of Spain, Italy, and Yugoslavia (see front cover for more information on long-term dryness) [11 weeks].

### 6. Middle East:

#### COLD AIR RETAINS GRIP.

Although temperatures returned to normal in northeastern Africa, bitterly cold weather persisted across the Middle East. Weekly temperature departures approached -13°C in Turkey. According to press reports, gales caused considerable damage in Israel and Lebanon while heavy snow, with daily temperatures as much as 20°C below normal, brought parts of Iran to a standstill [16 weeks].

### 7. Southern Africa:

#### HOT WEATHER AGGRAVATES DRYNESS.

Weekly temperature departures soared to +6°C in Zimbabwe [7 weeks] and exacerbated very dry conditions, characterized by moisture deficits of up to 250 mm since early February. Generally less than 20 mm of rain was reported, however, 20 to 40 mm moistened some locations in Zambia and Mozambique [14 weeks].

### 8. Ryukyu, Taiwan, and Southeastern China:

#### MODERATE PRECIPITATION REPORTED.

Scattered precipitation amounts of 40 to 70 mm dampened southern China while up to 80 mm fell on the Ryukyus. As much as 90 mm of rain drenched portions of Taiwan where some stations have measured as much as six times the normal amount since the beginning of February [6 weeks].

### 9. Philippines:

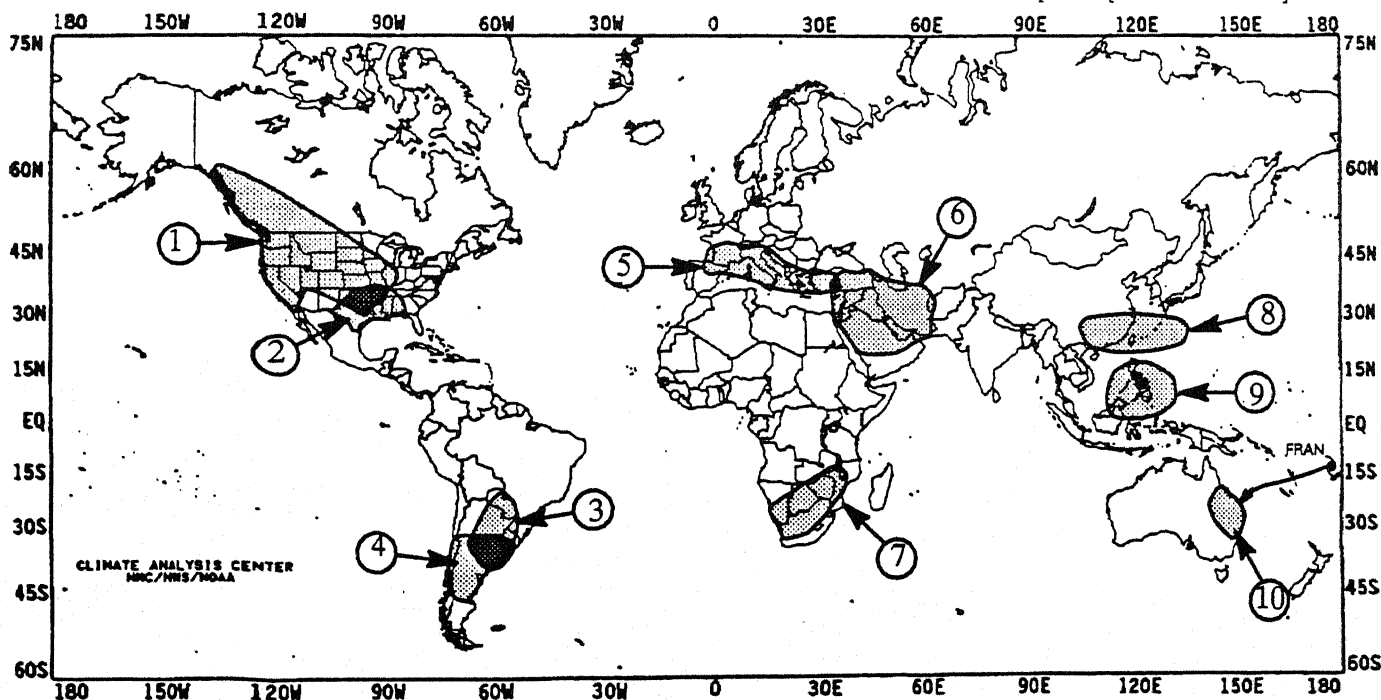
#### VERY DRY CONDITIONS CONTINUE.

Light to moderate precipitation (up to 30 mm) moistened eastern parts of the islands, but little or no rain was observed elsewhere as unseasonably dry weather persisted [11 weeks].

### 10. Eastern Australia:

#### CYCLONE FRAN BATTERS COAST.

Cyclone Fran approached the southeastern Queensland coast as the week ended, causing localized flooding and damaging sugar cane crops with winds in excess of 100 km/hr, according to press reports. A few locations received 75 to 165 mm of rain during Saturday and Sunday, but relief from recent wet spell continued in most other areas, where little or no rain was reported [Ended at 4 weeks].



#### EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.  
MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

# UNITED STATES WEEKLY CLIMATE HIGHLIGHTS FOR THE WEEK OF MARCH 8-14, 1992

Following two consecutive weeks of spring-like warmth across much of the country, a strong blast of frigid Arctic air plunged into the nation's midsection, generating much colder conditions from the High Plains to the Deep South. Up to a dozen daily record lows were established from Arkansas to New York. Sub-zero readings were found from the upper Midwest to the Northeast and freezing temperatures were observed as far south as Florida. Strong wind gusts generated heavy lake-effect snows and bitter wind chills across the Great Lakes and Northeast. More than 7 feet of snow buried Palmyra, NY, and amounts topping 40 inches were common at several locations in western New York. Blizzard-like conditions were reported from West Virginia to New York on Wednesday while strong wind gusts produced wind chills down to -35°F in the Great Lakes. The Arctic blast pushed into the Deep South, bringing freezing temperatures to northern Florida and record low daily maximum readings at both Tampa and Miami. The mercury struggled to only 54°F at Tampa, FL on Thursday and managed to reach only 63°F at Miami, FL on Friday. Farther west, heavy snow blanketed portions of the Rockies. Up to 2 feet of snow fell on parts of Colorado and more than a foot in the Arizona mountains. Severe weather preceded the Arctic outbreak as it pushed across the central and southern U.S. Violent thunderstorms raked portions of the Great Plains and Deep South, generating heavy rain, hail, and more than a dozen tornadoes, which caused extensive damage and claimed several lives in Louisiana, Mississippi and Alabama, according to press reports. Farther north, ice-jam flooding occurred along the Winooski River, leaving up to four feet of water in the streets of downtown Montpelier, VT and causing extensive damage to numerous businesses. Elsewhere, relatively mild and tranquil conditions prevailed across much of the western U.S. More than a dozen record daily highs were established in the Northwest as readings soared into the sixties and seventies. Abnormally warm conditions also enveloped most of Alaska while heavy rain soaked the southeastern portion of the state. More than 17 inches of precipitation soaked Yakutat, AK.

The week began with a storm system in the Great Basin, spreading heavy snow from the higher elevations of Arizona to the Colorado Rockies. Strong wind gusts and heavy snow produced blizzard-like conditions at times in eastern Colorado. The storm slowly worked eastward into the central Plains. Meanwhile, a cold front raced southeastward out of central Canada, ushering Arctic air into the northern Plains. The frontal system continued to the southeast, where the trailing edge linked up with the low in the central Plains. Warm, moist air ahead of the storm system clashed with the Arctic blast, spawning severe thunderstorms across the southern Plains. More than half a dozen tornadoes touched down in Kansas, Oklahoma and Texas on Sunday. The low and cold front continued their slow progression to the east, generating more severe weather on Monday. Thunderstorms packing heavy rain, hail, and several tornadoes rolled across the southern Plains and lower Mississippi Valley. More than 4 inches of rain fell in 5 hours on Index, AR, flooding numerous roads. Flash flooding also affected parts of north-central Texas as slow-moving thunderstorms dumped copious amounts of rain while numerous homes were damaged or destroyed from Louisiana to Alabama on Monday by a rash of tornadoes. Behind the system, significantly colder conditions plunged into the nation's midsection. The low eventually turned to the northeast, crossing the Tennessee Valley before moving into the central Appalachians late

Tuesday while the trailing cold front swept through the South. Heavy rain soaked the Tennessee Valley, and severe thunderstorms moved through portions of the mid-Atlantic, accompanied by damaging wind gusts. Farther north, heavy snow blanketed the upper Midwest and Great Lakes. More than half a foot fell from parts of Minnesota eastward to Michigan, with more than a foot measured at Melstrand, MI.

During the latter half of the week, the low continued to move to the Northeast, dumping heavy snow on northern and western New England. Up to 2 feet of snow fell from western Pennsylvania to western New York. Buffalo, NY recorded 16.9 inches of snow on Wednesday and Thursday, which was the greatest 24-hour total since January 1985. The storm system exited the U.S. by Thursday but strong northwesterly winds behind the low generated heavy lake-effect snow squalls from Michigan to New York. Four consecutive days of snow buried parts of western New York under 3-7 feet of snow. Meanwhile, unseasonably cold weather settled across the eastern half of the nation. Unusually cooler weather was common across much of the Deep South on Thursday, including the northern half of Florida, where highs were only in the fifties. Elsewhere, unseasonably warm weather prevailed in the Northwest as a dome of high pressure dominated the western half of the nation. More than a dozen record daily highs were observed from Washington to Montana Thursday through Saturday.

According to the River Forecast Centers, the greatest weekly precipitation totals (more than 2 inches) fell in a band from extreme northeastern Texas through northern portions of the lower Mississippi Valley and into the Tennessee Valley, across southeastern Alaska, and on scattered locations in the Appalachians, northern New England, the upper Midwest, the central Rockies, the Southwest, and coastal northern California (Table 1). Light to moderate amounts were measured across the remainder of the Northeast, and in the mid-Atlantic, the Ohio Valley, the Deep South, the Great Lakes, the central Plains and Rockies, the northeastern quarter of Texas, the Southwest, the northern half of California, southern and extreme northwestern Alaska, and Hawaii. Little or no precipitation was reported in the northern and the remainder of the southern Plains, the northern and southern Rockies, the Great Basin, southern California, the Northwest, and the remainder of Alaska.

Unseasonably warm weather was confined to the western half of the nation and along the coastal sections of the northern and mid-Atlantic (Table 2). Weekly departures of +10°F to +14°F were observed across northern portions of the Intermountain West, where highs topped 70°F. Departures of +4°F to +9°F were common across the northern and central Plains, central Rockies, and Great Basin. Temperatures were near to slightly above normal from Oklahoma westward across the northern halves of New Mexico and Arizona, and through most of California as well as along the northern two-thirds of the Atlantic Coast. Unusually mild weather returned to most of Alaska, with weekly departures of +10°F to +21°F common across the eastern two-thirds of the state.

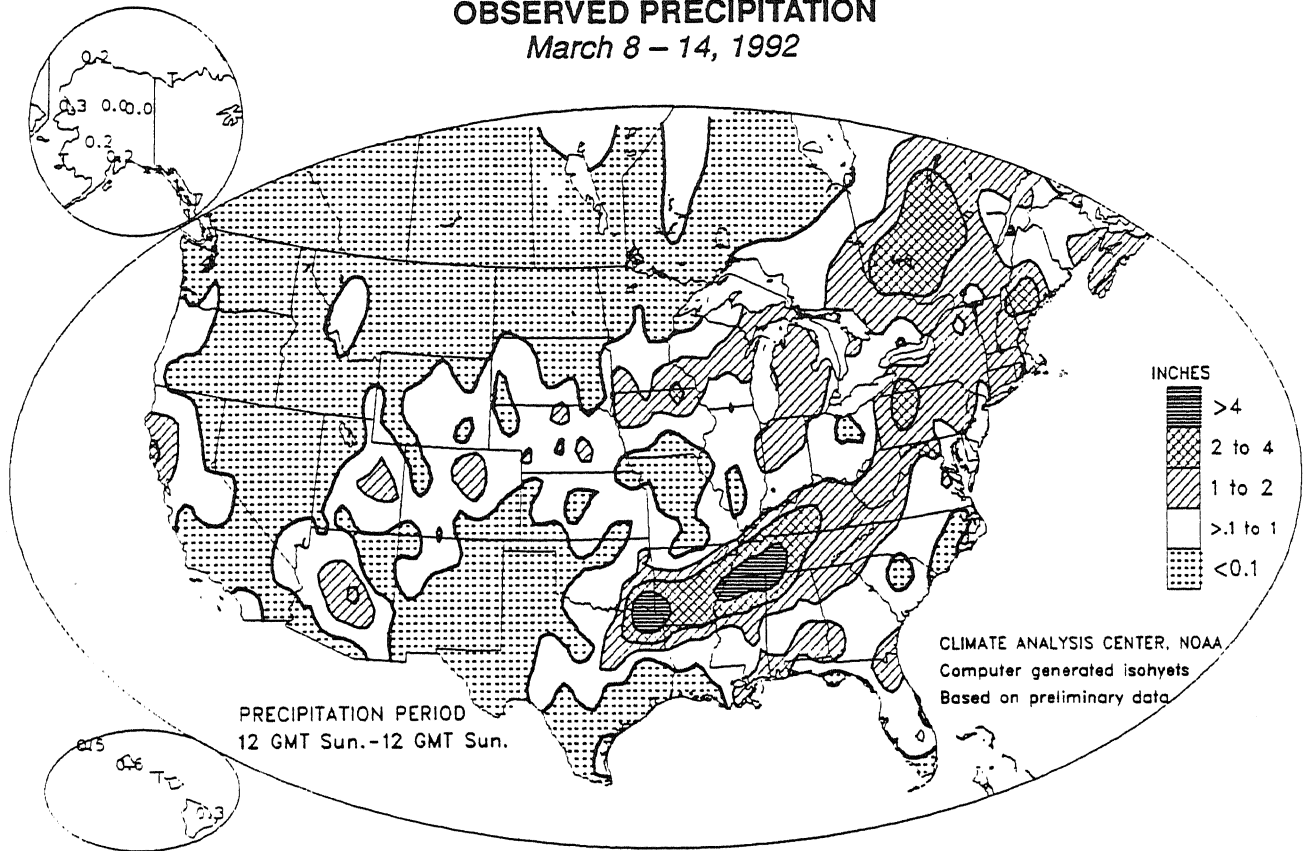
The Arctic outbreak generated below normal temperatures across most of the eastern half of the U.S. (Table 3). Weekly departures of -4°F to -8°F were common from northern Minnesota southward to central Florida while near to slightly below normal temperatures prevailed across the lower two-thirds of the Mississippi Valley, the Appalachians, and southern Florida.

**TABLE 1. SELECTED STATIONS WITH 2.00 OR MORE INCHES OF PRECIPITATION DURING THE WEEK OF MARCH 8 - 14, 1992**

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
YAKUTAT, AK	17.27	PINE BLUFF, AR	2.77
MUSCLE SHOALS, AL	4.64	ANNETTE ISLAND, AK	2.75
BRADFORD, PA	4.25	NASHVILLE, TN	2.68
JACKSON, TN	4.10	BOWLING GREEN, KY	2.60
CORDOVA/MILE 13, AK	4.02	MT WASHINGTON, NH	2.56
MEMPHIS, TN	3.87	EL DORADO, AR	2.55
SITKA, AK	3.84	DUBOIS, PA	2.38
JUNEAU, AK	3.40	AUGUSTA, ME	2.27
MEMPHIS NAS, TN	3.03	LITTLE ROCK AFB, AR	2.14
VALDEZ, AK	2.87	LITTLE ROCK, AR	2.10
HOPKINSVILLE/CAMPBELL AAF, KY	2.79	BLTTHEVILLE AFB, AR	2.04

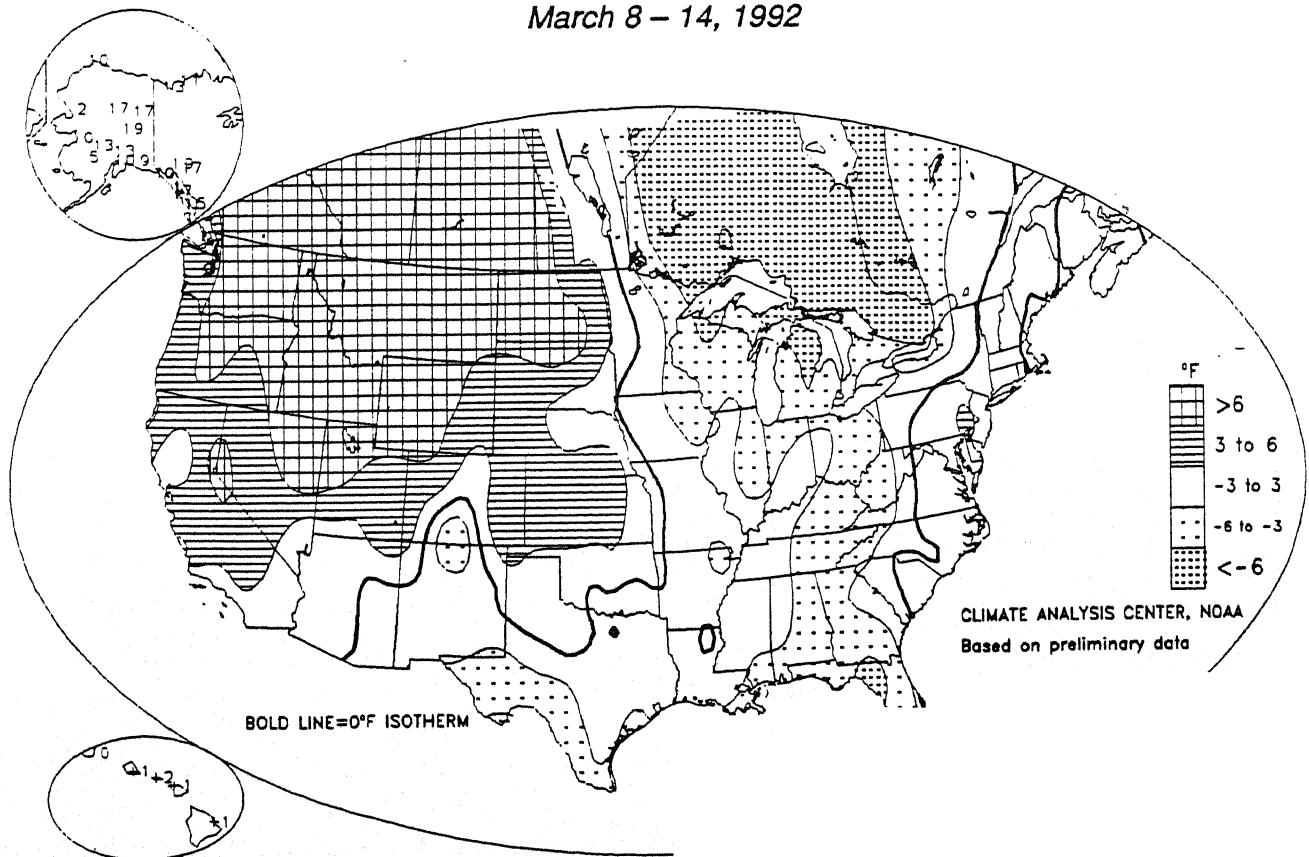
# **OBSERVED PRECIPITATION**

March 8 - 14, 1992



# **DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)**

March 8 - 14, 1992



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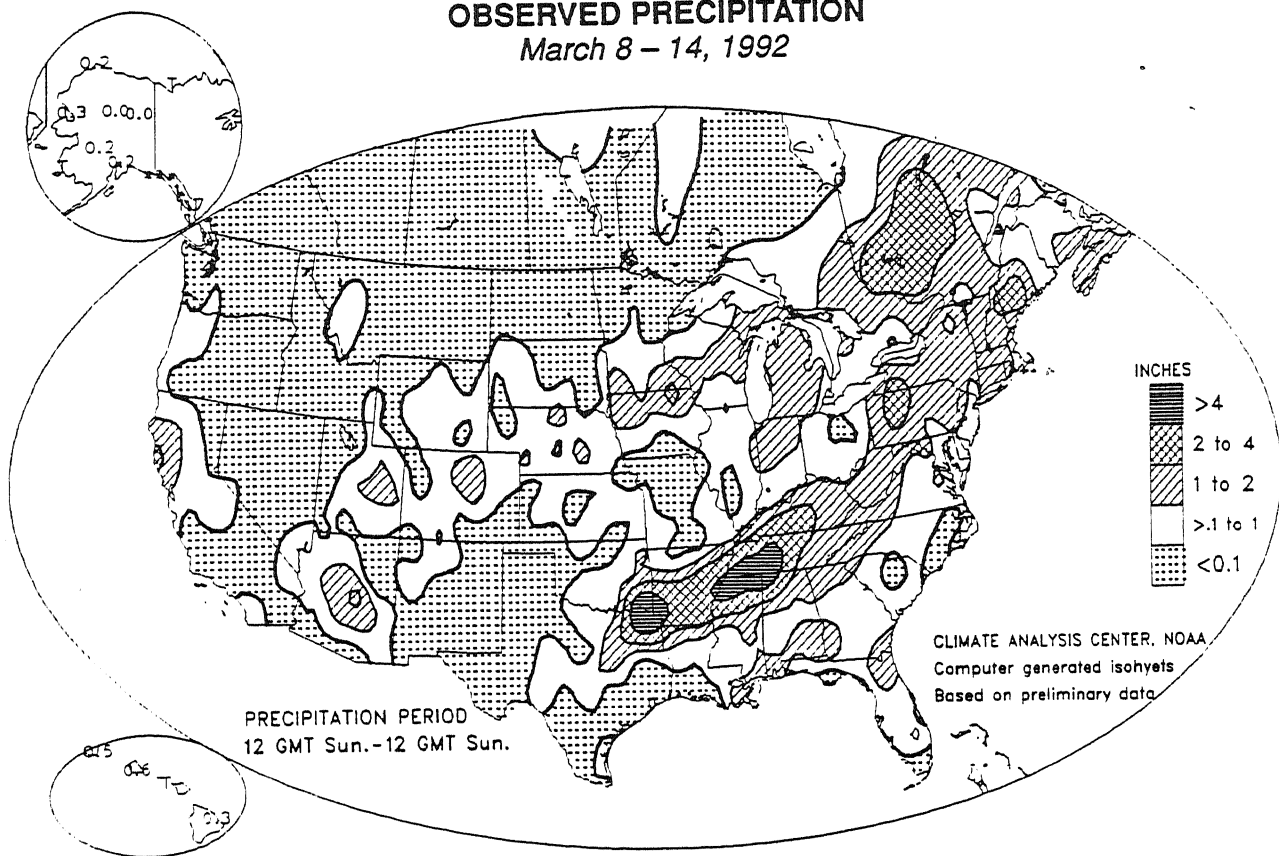
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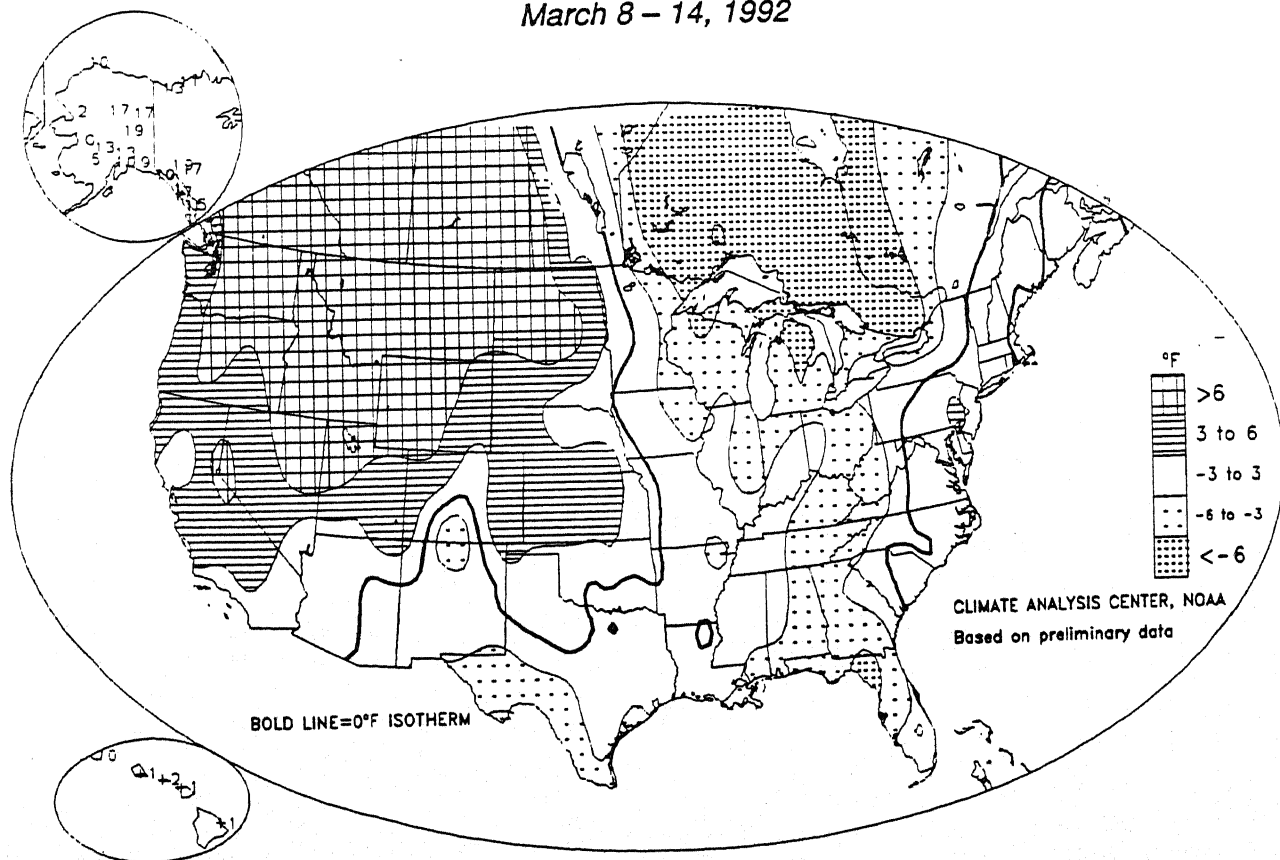
# **OBSERVED PRECIPITATION**

*March 8 - 14, 1992*



# **DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)**

*March 8 - 14, 1992*

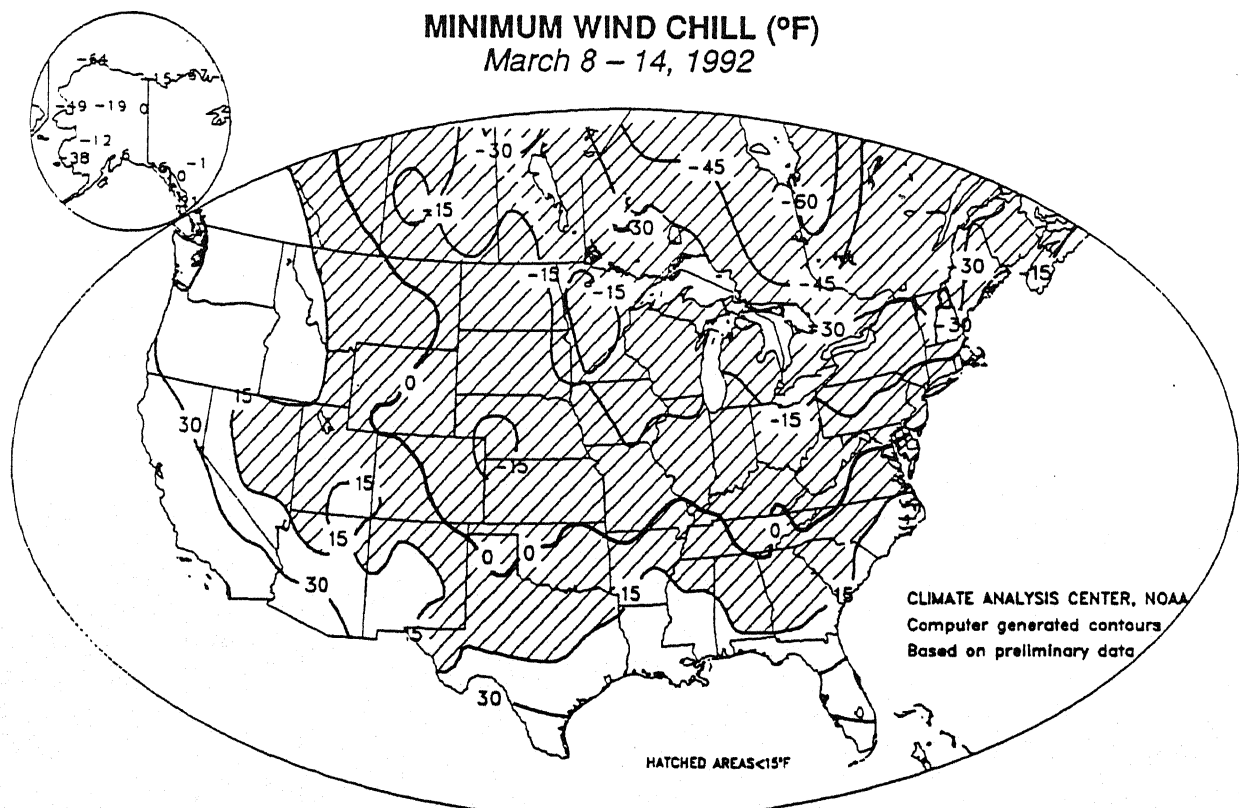


**TABLE 2. SELECTED STATIONS WITH TEMPERATURES AVERAGING 10.5°F OR MORE ABOVE NORMAL FOR THE WEEK OF MARCH 8 – 14, 1992**

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
BIG DELTA, AK	+21.0	30.6	BUTTE, MT	+12.7	37.7
FAIRBANKS, AK	+19.5	25.5	KENAI, AK	+12.0	31.2
FT YUKON, AK	+17.8	16.9	LEWISTOWN, MT	+11.8	38.8
BETTLES, AK	+17.4	18.3	GLASGOW, MT	+11.8	37.5
STAMPEDE PASS, WA	+15.9	45.4	ILIAMNA, AK	+11.3	29.3
GULKANA, AK	+15.8	27.7	GREAT FALLS, MT	+11.2	41.6
NORTHWAY, AK	+14.7	18.6	SEXTON SUMMIT, OR	+10.9	48.1
CUT BANK, MT	+13.7	39.8	ANCHORAGE, AK	+10.7	32.6
BOZEMAN, MT	+13.7	39.7	SPOKANE, WA	+10.6	47.2
TALKEETNA, AK	+13.6	31.6	IDAHO FALLS, ID	+10.6	41.6
MCGRATH, AK	+13.6	19.9	SHERIDAN, WY	+10.6	41.3
HAVRE, MT	+12.7	40.3			

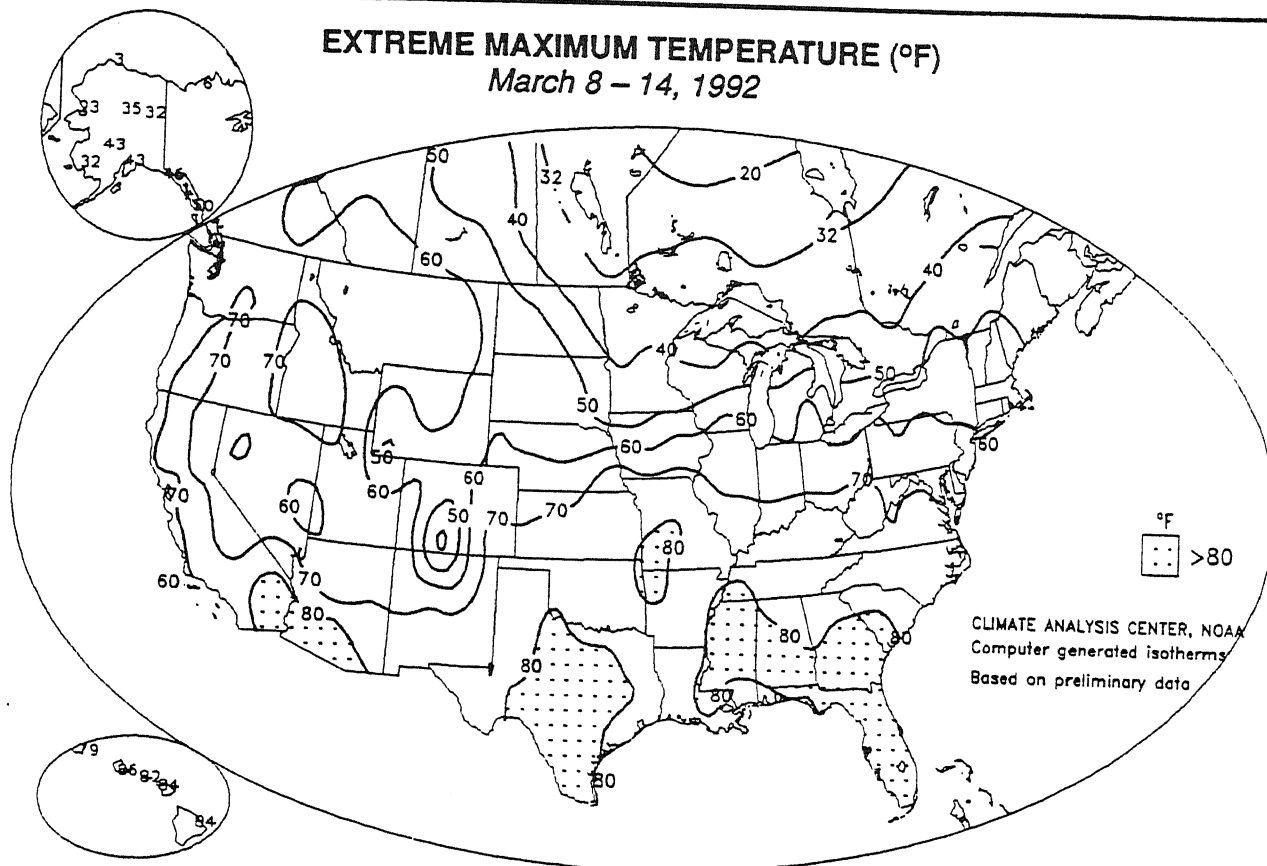
**TABLE 3. SELECTED STATIONS WITH TEMPERATURES AVERAGING 5.0°F OR MORE BELOW NORMAL FOR THE WEEK OF MARCH 8 – 14, 1992**

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
SAULT STE MARIE, MI	-10.1	12.1	SAGINAW, MI	-5.8	24.6
ST PAUL ISLAND, AK	-8.4	14.8	ESCENABA, MI	-5.6	19.2
PARK FALLS, WI	-7.4	16.3	HOUGHTON LAKE, MI	-5.4	20.1
ALAMOSA, CO	-7.3	23.4	WAUSAU, WI	-5.3	19.6
LANSING, MI	-7.0	24.6	CEDAR RAPIDS, IA	-5.3	27.7
FLINT, MI	-6.4	24.6	GREEN BAY, WI	-5.2	21.6
BLUEFIELD, WV	-6.2	34.7	GAINESVILLE, FL	-5.2	57.9
ROCHESTER, MN	-6.1	20.9	HANCOCK/HOUGHTON CO, MI	-5.1	16.3
PELLSTON, MI	-6.0	17.1	PARKERSBURG/WOOD CO, WV	-5.1	36.6
ALPENA, MI	-6.0	20.0			



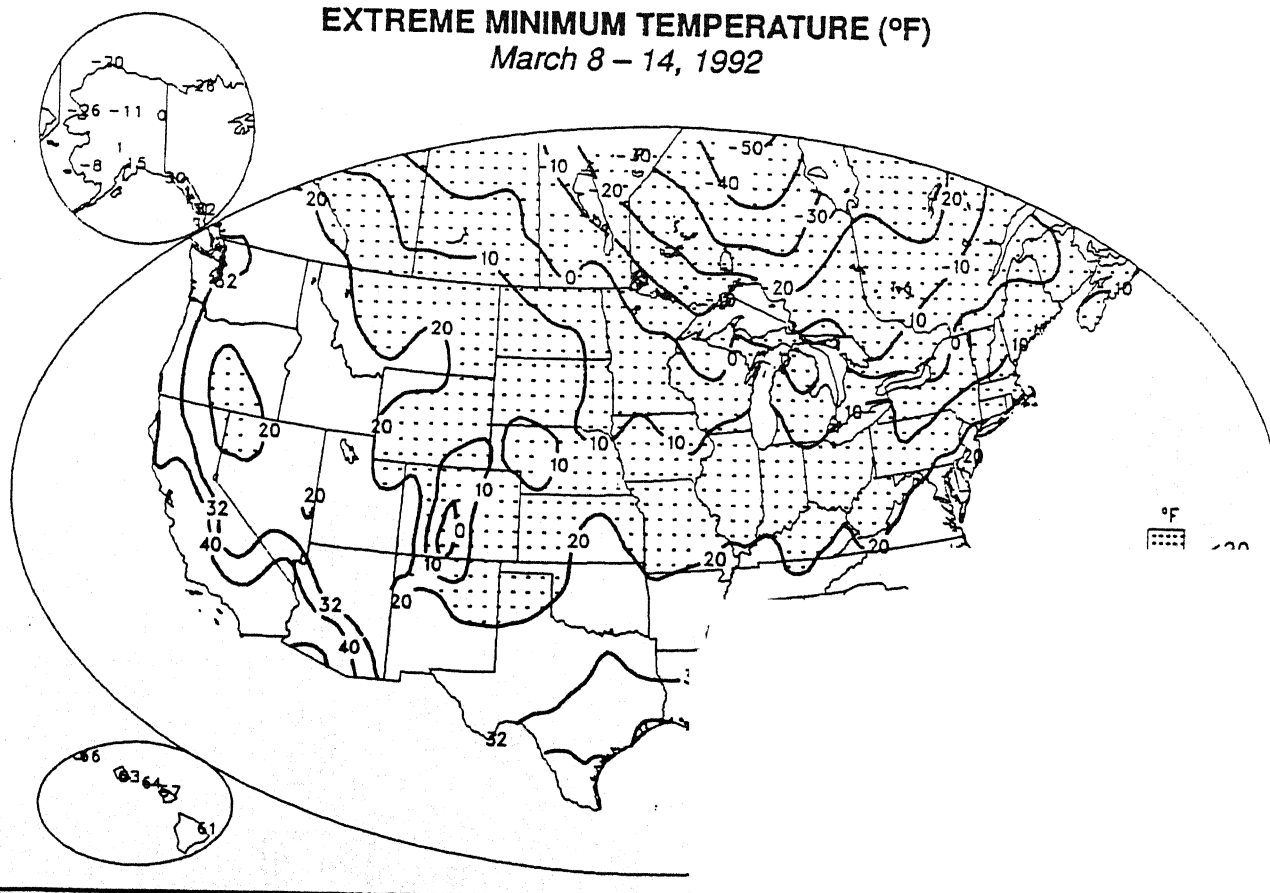
**FIGURE 1.** Strong winds accompanied a blast of bitter Arctic air across the central and eastern sections of the country, bringing sub-zero wind chills southward to the south-central Plains, Tennessee Valley, and mid-Atlantic. Dangerously low readings, below -30°F, were restricted to northern New England.

# **EXTREME MAXIMUM TEMPERATURE (°F)** **March 8 – 14, 1992**



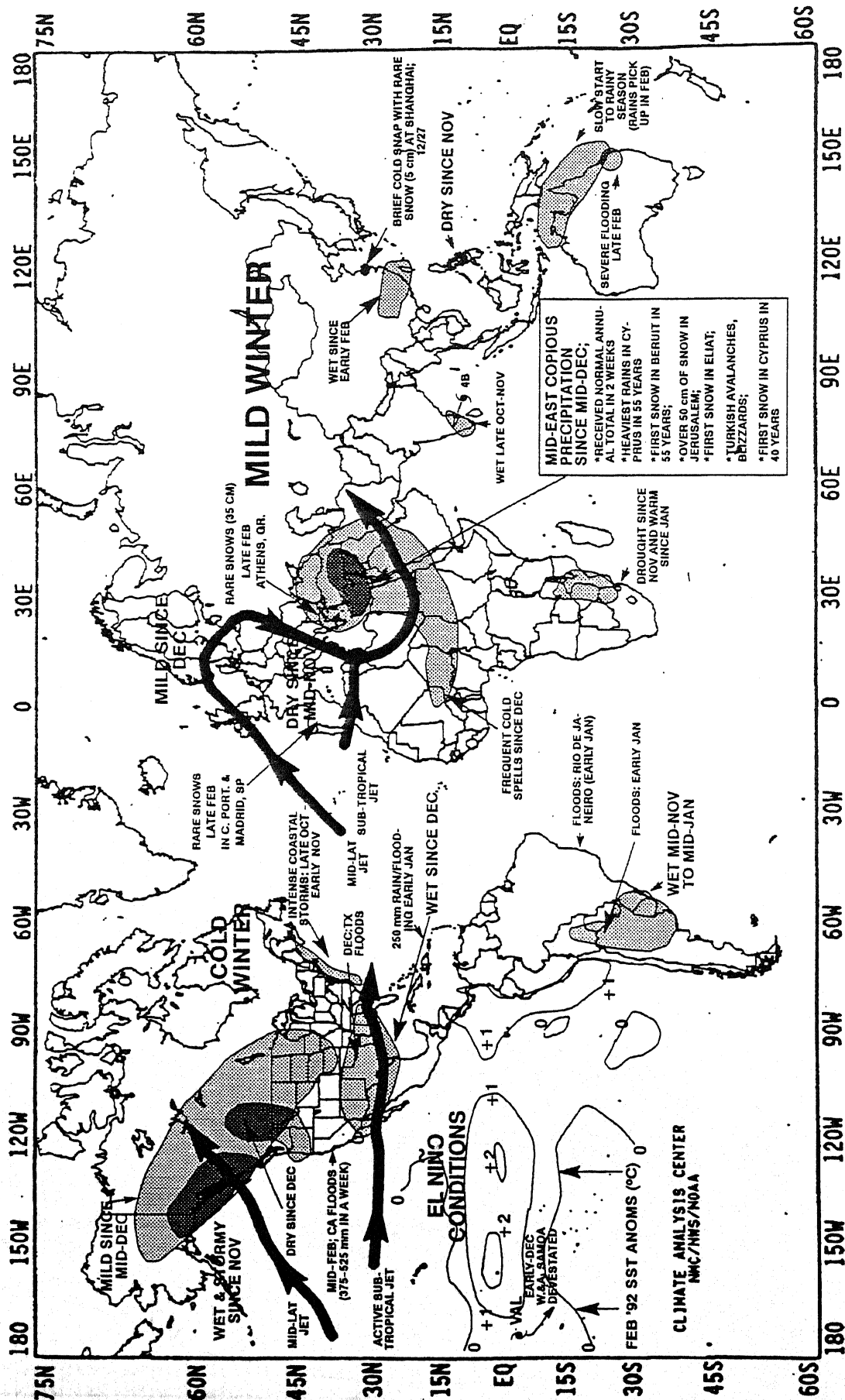
An Arctic blast early in the week brought an abrupt end to unseasonably mild weather through much of the central and eastern U.S. Highs in the seventies (top) and lows in the teens (bottom) were observed across a large chunk of the nation's mid-section only a few days apart.

# **EXTREME MINIMUM TEMPERATURE (°F)** **March 8 – 14, 1992**



# SIGNIFICANT GLOBAL CLIMATE HIGHLIGHTS, EVENTS, AND ANOMALIES

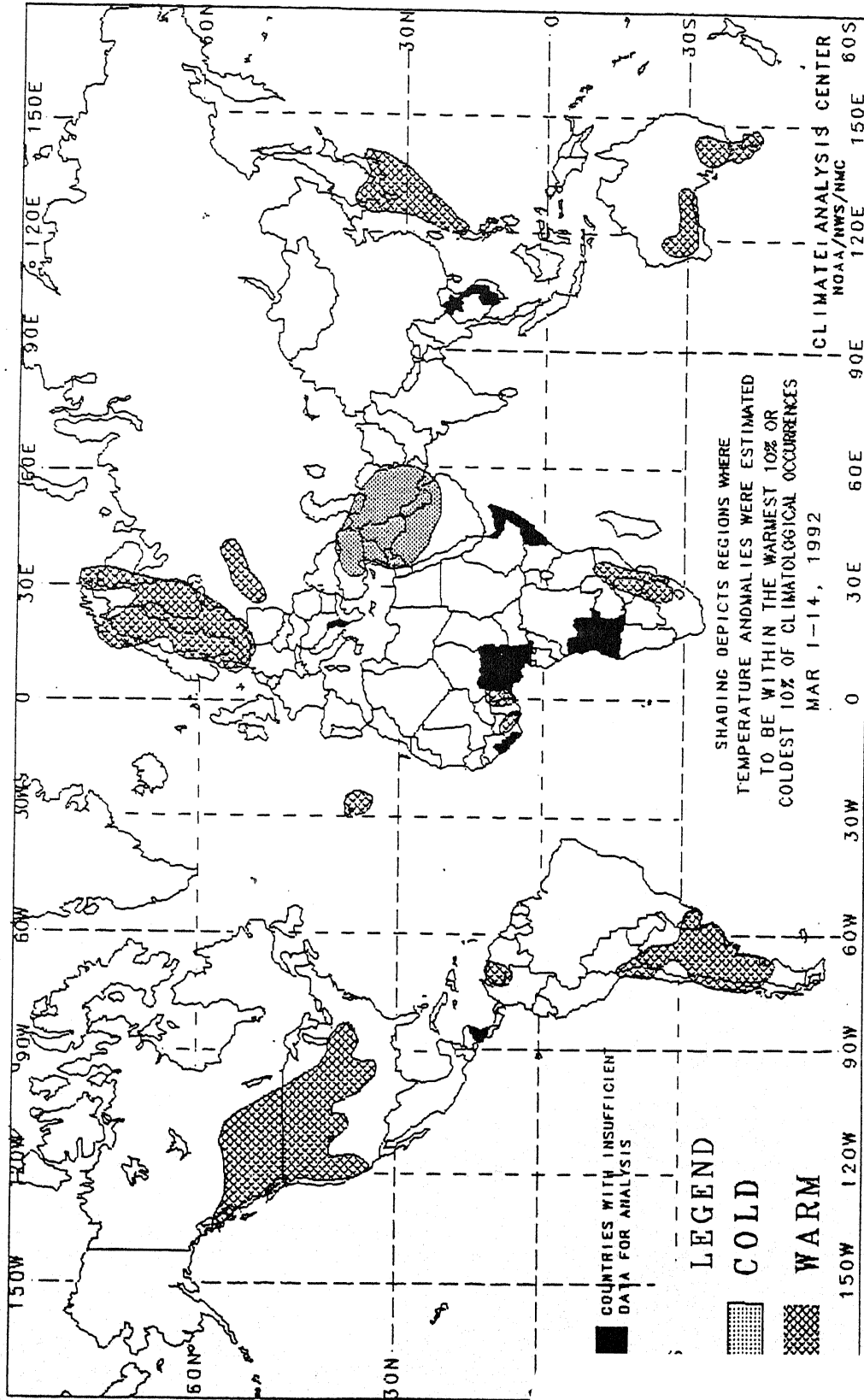
October 1991 – Mid-March 1992



The last several months have brought a variety of unusual climatic anomalies and episodic events to many parts of the globe, the most significant of which are summarized above. For more details on the 1991 – 1992 Winter (Dec – Feb) in the United States, see pp. 9– 18.

# 2-WEEK GLOBAL TEMPERATURE ANOMALIES

MARCH 1 - 14, 1992



The anomalies on this chart are based on approximately 2500 observing stations in at least 13 days of temperature observations were received from synoptic stations. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

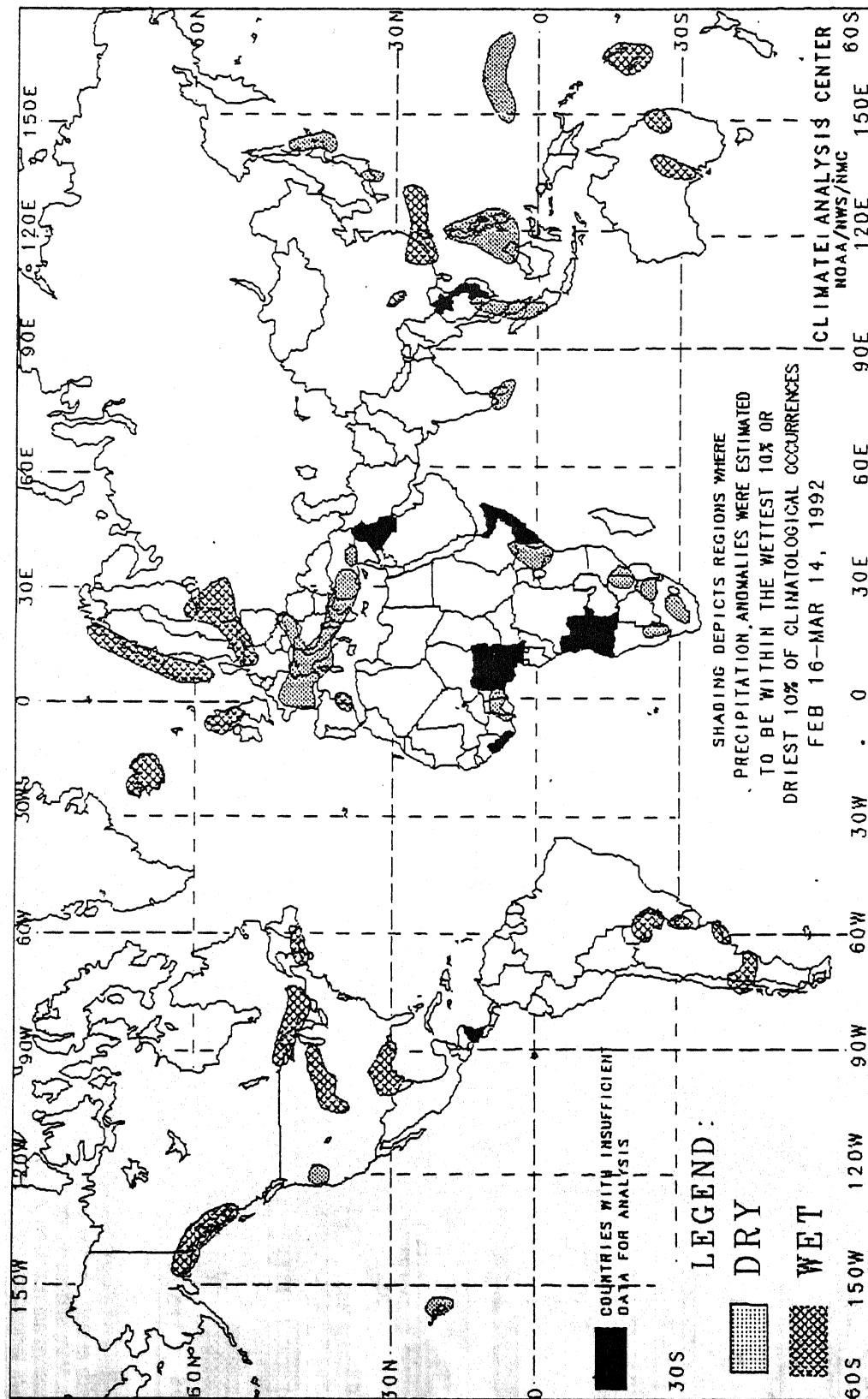
Temperature anomalies are not depicted unless the magnitude of temperature anomalies exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

# 4-WEEK GLOBAL PRECIPITATION ANOMALIES

FEBRUARY 16 - MARCH 14, 1992



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such and regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

# UNITED STATES SEASONAL CLIMATE SUMMARY

## WINTER (DECEMBER – FEBRUARY) 1991 – 1992

The nation as a whole experienced the warmest winter on record during 1991–1992, according to the National Climatic Data Center (NCDC) (page 10), bringing the long-term winter trend slightly above the levels attained during the early 1950's. Of the nine regions defined by NCDC, six experienced one of the ten mildest winters since 1895–1896 (page 11) as did 20 of the 48 contiguous states (page 18). Only the Southwest region and nine scattered states were not among the mildest 25% of all winter seasons. Temperatures averaged above normal throughout the country, except in portions of western Maine, the central Rockies, and northern and western Alaska.

The widespread mild conditions were due in part to upper-level circulation patterns induced by the current low-index (warm) ENSO episode (for more information, see the ENSO advisory #92/03 on pp. 19–22). The mild weather across southwestern Canada and the northern Plains and the unusually wet conditions from central Texas eastward along the Gulf Coast both correlate well with typical warm episode reflections during the colder half of the North American year, although other typical warm episode reflections were not observed, such as an abnormally mild November–March in Maine and southeastern Canada (see the ENSO Advisory #92/01, contained in Weekly Climate Bulletin #92/02 on pp. 25–26 for a graphic depiction of November–March ENSO-correlated climate anomalies). The primary cause of both anomalies was the split jet stream, typical during warm ENSO episodes, that dominated North America. The southern branch, also called the sub-tropical jet, brought Pacific and Gulf moisture primarily eastward into Texas and the Gulf Coast and occasionally northward into California. Meanwhile, the northern branch, alternatively known as the Arctic or mid-latitude jet, remained primarily north of the lower 48 states, keeping Arctic air from diving southward into the country.

The pattern that enveloped the nation during December was similar to the December–February average. Above normal temperatures covered most of the country, with the largest positive departures observed in the northern Plains, while exceptionally heavy precipitation hammered the southern Plains and abnormal dryness plagued the northwestern quarter of the country. Torrential rains pounded central and eastern Texas around mid-month, sending rivers and streams out of their banks and inundating farmland and homes. Flooding was near or above record levels along the Guadalupe, Brazos, Trinity, and Colorado Rivers, and streamflows remained exceptionally high through the end of the season. As much as 16.2 inches of rain deluged the region between San Antonio and Austin during December 18–22, and additional moderate to heavy rains through February aggravated moisture surpluses. According to press reports, an estimated \$75 million in damage was caused by the first round of river flooding. In addition, heavy rains also engendered dangerous flooding in northeastern sections of Kauai Island, HI when localized thunderstorms dumped up to 15 inches of rain within 24 hours on December 14. Resultant flash flooding along the Anahola River took 3 lives and caused an estimated \$7.1 million in damage. As the month ended, a pair of strong Pacific storms brought California some badly needed precipitation following another slow start to a wet season (beginning in October). Up to 4 inches of rain soaked many coastal locations while as much as 4 feet of snow blanketed higher elevations.

January brought a similar pattern to the nation, with a few minor differences. Abnormally wet weather spread eastward across the central Gulf Coast while pockets of slightly cooler than normal weather developed across interior California, in southern Texas, and along the Gulf Coast. Exceptionally large departures of +12°F to +19°F covered the northern High Plains and the northern and central Great Plains, which were approximately twice the departures observed during December. Meanwhile, very dry conditions continued across much of the northwestern quarter of the country, and pockets of unusually low precipitation totals were observed in the middle and northern lower Mississippi Valley, the Tennessee Valley, and portions of the central Appalachians and mid-Atlantic. As 1992 began, a strong winter storm in the Midwest that dumped up to a foot of snow on portions of the central Rockies and Great Plains merged with a developing system along the Southeast coast. These two lows organized into a powerful storm, with a central pressure of 968 mb, southeast of Norfolk, VA and spread heavy rain and high winds along the southern and middle Atlantic coasts. The storm moved inland across the southern Delmarva Peninsula, continued westward into south-central Virginia, began to move southeastward toward the Outer Banks of North Carolina, and finally accelerated off to the northeast. Hurricane-force wind gusts and serious coastal flooding were observed in eastern Maryland and Delaware as the storm moved onshore. As January continued, a severe winter storm dumped up to 3 feet of snow on the Sierra Nevadas and Siskayou and generated heavy rains and minor flooding in southern California. As this storm progressed eastward, more heavy snow buried portions of the central Rockies as both Cheyenne, WY and Denver, CO recorded the greatest single-storm totals during January in at least 71 years (14 inches). A brief Arctic blast interrupted an otherwise mild winter from the Great Plains eastward to the Atlantic Seaboard as wind chills dropped to -71°F at Fargo, ND. Shortly thereafter, a series of "Alberta clipper" systems dropped southeastward out of western Canada and trekked through the nation's mid-section. One clipper brought Detroit its heaviest snowfall in ten years (12 inches), and the cold northwesterly winds that the clippers left in

their wake generated heavy lake-effect snows from northern Ohio northeastward to western upstate New York, where some locations were buried under more than 30 inches. The Arctic air sank as far south as the Gulf Coast, and a weak disturbance moving eastward out of the central Plains forced Gulf moisture over the relatively low-level cold air, generating the season's only widespread snowfall across the deep South. A narrow swath from central Texas eastward to the Southeast Atlantic Coast was briefly blanketed under 4 to 8 inches of snow. During the latter half of the month, a series of clippers kept cold air and periodic light to moderate snows across the Midwest, Great Lakes, and Northeast before milder weather returned as the month ended. Tranquil weather continued in most of the Pacific Northwest, although a series of storms brought very heavy rains to the immediate Washington coast, while an exceptionally mild outbreak was observed across the northern Plains. Several monthly records were observed as readings soared into the seventies.

Moderate to heavy rains continued across central Texas and the Gulf Coast during late January and continued through much of February, establishing new seasonal precipitation records at a number of Texas locations. Elsewhere, inundating precipitation moved into much of California. Flooding and mudslides became commonplace in southern parts of the state while up to 25 inches of precipitation barged the northern Sierra Nevadas and southern Cascades. Large volumes of runoff were generated by torrential downpours, causing the Los Angeles River to rise 7 feet in one hour and washing several cars and 66 tons of sewage into the Pacific Ocean. More than \$23 million in damage was generated by the storms, according to press reports, but the moisture provided only limited improvement in the state's hydrological situation, with reservoir storage and mountain snowpack remaining below normal for the current wet season. As storms traversed the Rockies and redeveloped over the Plains, more heavy drenched parts of Texas while spring-like severe weather, including damaging wind gusts, and several tornadoes, occasionally battered parts of the deep South. Mild weather continued across most of the nation, with over 100 record highs established during the last week of February alone. In sharp contrast, very cold air settled into much of Alaska, where readings dropped as low as -40°F. Wet weather plagued the southern tier of the 49th state as nearly 15 inches of rain deluged Yakutat, AK in one week; however, drought conditions developed in Hawaii. Some locations on the Big Island recorded only a few tenths of an inch of rain during the first two months of 1992.

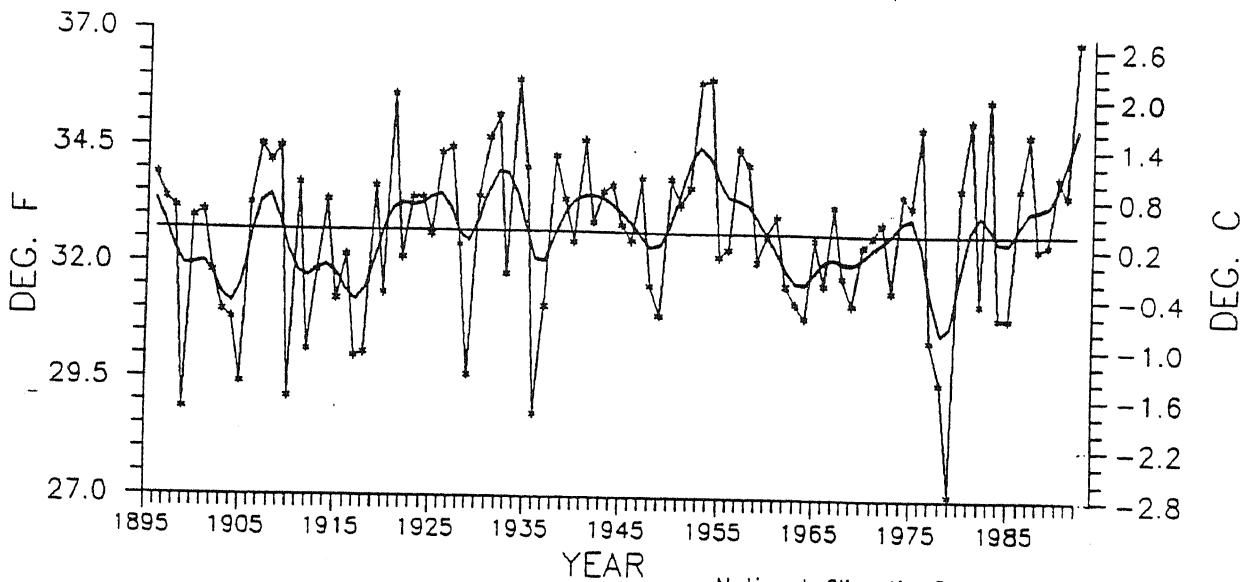
According to the River Forecast Centers, the Winter's heaviest precipitation (20–36 inches) fell on the western half of Washington, northwestern Oregon, southern Cascades, the northern Sierra Nevadas, portions of central and southern Texas, much of the central Gulf Coast, and the southern Appalachians. Double-digit totals were measured across most of the central Appalachians, Mississippi Valley, central and northern California, and the remainder of the Pacific Northwest. These totals corresponded to over four times the seasonal normal through much of Texas and southeastern New Mexico while more than twice the normal totals fell on the desert Southwest, the central and south-central Great Plains, and parts of the southern lower Mississippi Valley (Table 1, Figures 1 and 2). According to NCDC, the wettest winter on record was observed in Texas (Page 16) and New Mexico (Page 18), and the South region experienced its second wettest such period (Page 11). In addition, more than 69 inches of precipitation fell on Yakutat, AK, which exceeded twice the location's seasonal winter value. Nationally, this Winter was the first to bring above normal precipitation to the country as a whole since 1984–1985, but only slight deviations from normal were observed during 8 of the last 9 winters (page 10).

In sharp contrast, four states (ID, MT, OR, WY) endured one of the five driest winters in 97 years of record, according to NCDC. Under two inches of rain were recorded on parts of the Big Island, HI, as well as across most of the Great Plains, the northern and central Plains, and scattered parts of central Florida and the western Great Lakes. Widespread drier than normal conditions were observed throughout the northwestern quarter of the country, except along the immediate Pacific coast, and across the northern High Plains (Table 2, Figures 1 and 2). The Northwest region experienced the sixth consecutive significantly drier than normal winter, with 1991–1992 being the driest of the series (page 17). The West Central and Northwest regions reported the fourth and seventh driest Winters on record, respectively. Portions of eastern Montana received under 10% of seasonal totals.

The warmest Winter on record nationally brought huge seasonal departures of +9°F to +14°F to much of the northern half of the Great Plains and eastern Montana as statistically significant seasonal warmth (>70th %ile) covered the vast majority of the country (Table 3, Figures 3 and 4). The Winter of 1991–1992 averaged 1°F higher nationally than the two winters that effectively shared the coldest records (1933–1934 and 1953–1954; page 10).

Except for an isolated location in the central Rockies, no stations reported seasonal departures below -3°F and none of the contiguous U.S. experienced statistically significant below normal temperatures (Table 4, Figures 3 and 4). In the lower 48 states, only two (ME and NM) recorded below median temperatures.

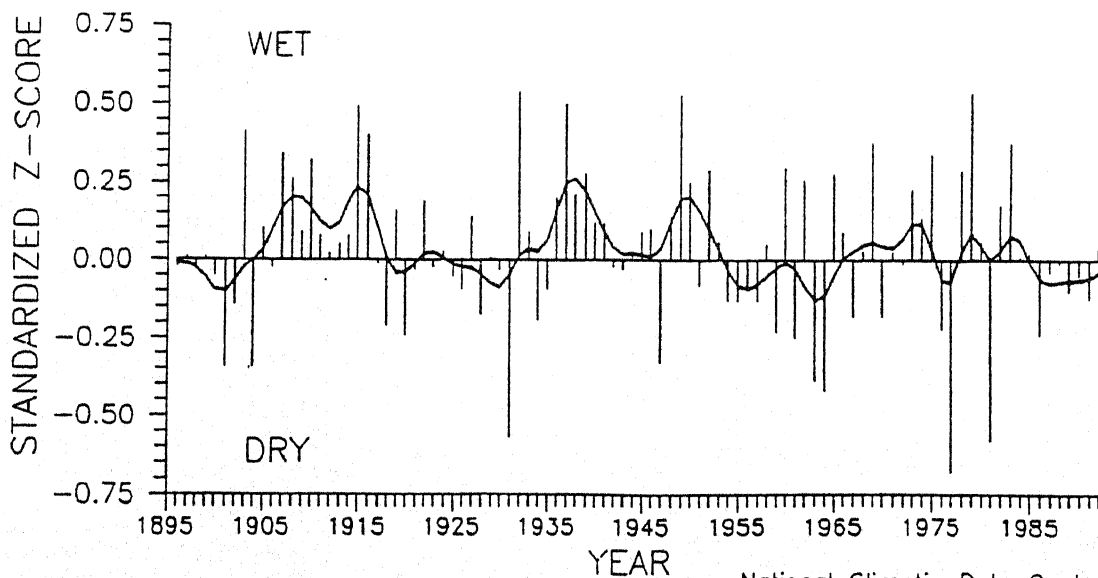
# U.S. NATIONAL TEMPERATURE DEC-FEB, 1895-96 to 1991-92



National Climatic Data Center, NOAA

Nationally Averaged Winter Temperatures (December – February) 1895/96 – 1991/92, as computed by the National Climatic Data Center. *The Winter of 1991/92 was the warmest on record and the third consecutive winter with well above normal temperatures nationally.*

## U.S. NATIONAL WEIGHTED MEAN PRECIPITATION INDEX DEC-FEB, 1895-96 to 1991-92



National Climatic Data Center, NOAA

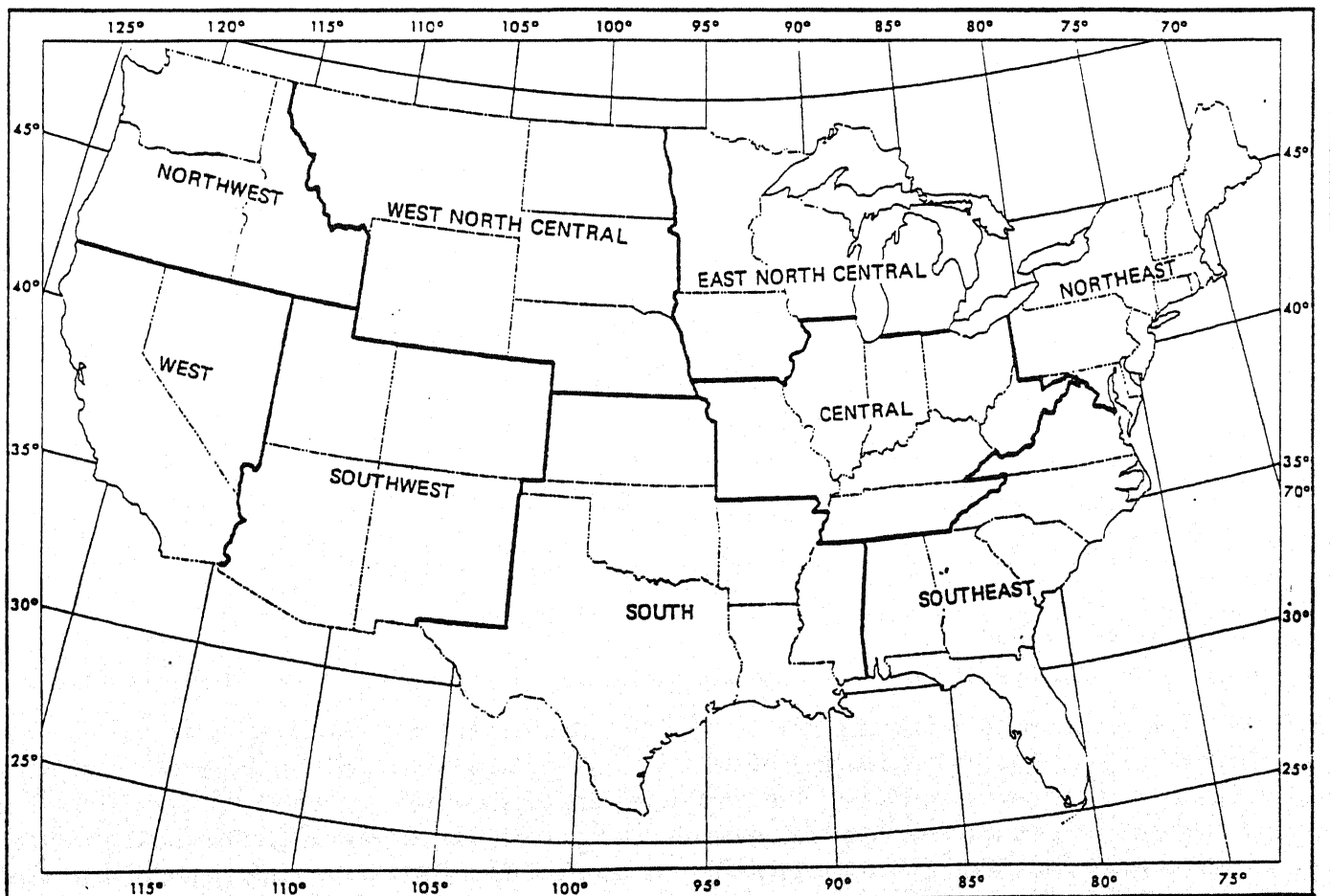
– February) 1895/96 – 1991/92, as computed by the  
*huly above median precipitation to the country, but was the sixth  
rasting local extremes, not widespread near normal totals, were*

**TEMPERATURE AND PRECIPITATION RANKINGS FOR  
DECEMBER 1991 – FEBRUARY 1992, BASED ON THE  
PERIOD 1895 – 1896 TO 1991 – 1992.  
1 = DRIEST/COLDEST AND 97 = WETTEST/HOTTEST.**

REGION	PRECIPITATION	TEMPERATURE
NORTHEAST	29	78
EAST NORTH CENTRAL	45	94
CENTRAL	35	95
SOUTHEAST	59	78
WEST NORTH CENTRAL	4	97
SOUTH	96	88
SOUTHWEST	76	61
NORTHWEST	7	96
WEST	53	80
NATIONAL	54	97

*National Climatic Data Center*

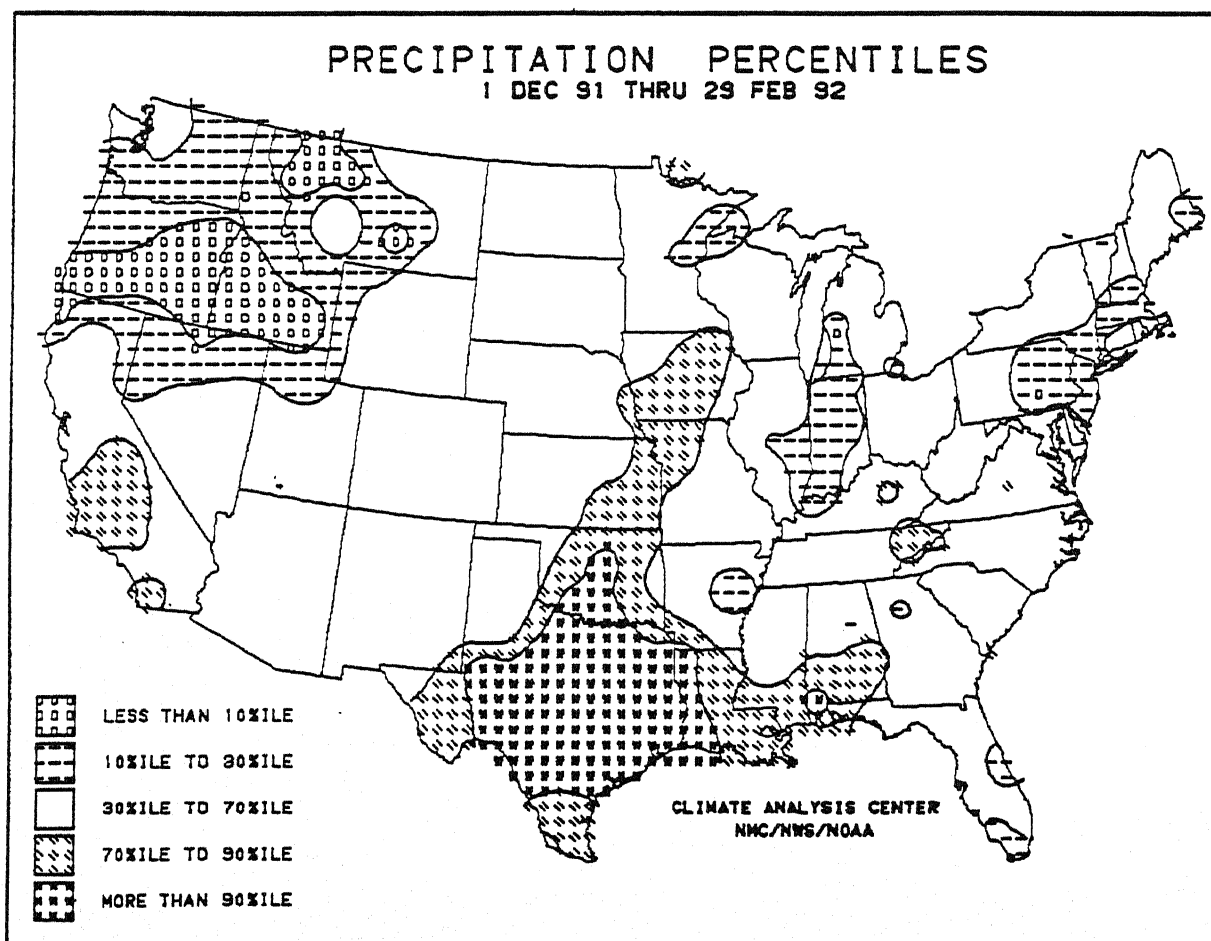
THE 9 U.S. REGIONAL BOUNDARIES AS DEFINED BY THE NATIONAL CLIMATIC DATA CENTER (NCDC) AND REGULARLY USED IN THE MONTHLY AND SEASONAL U.S. CLIMATE SUMMARIES.



**TABLE 1. SELECTED STATIONS WITH 150% OR MORE OF NORMAL PRECIPITATION AND 19.00 INCHES OR MORE PRECIPITATION; OR, STATIONS WITH 20.00 INCHES OR MORE PRECIPITATION AND NO NORMALS DURING WINTER 1991 – 1992.**

<u>STATION</u>	<u>TOTAL</u> (INCHES)	<u>PCT. OF</u> <u>NORMAL</u>	<u>STATION</u>	<u>TOTAL</u> (INCHES)	<u>PCT. OF</u> <u>NORMAL</u>
YAKUTAT, AK	69.21	213.4	AUSTIN/BERGSTROM AFB, TX	22.83	339.7
PORT ARTHUR, TX	29.08	220.5	COLLEGE STATION, TX	21.99	261.2
VALDEZ, AK	27.60	176.9	MONTGOMERY, AL	21.53	160.2
LAFAYETTE, LA	26.68	186.7	NEW ORLEANS NAS, LA	21.26	***
SAN ANTONIO, TX	25.98	549.3	BILOXI/KEESLER AFB, MS	20.83	152.6
AUSTIN, TX	25.56	419.0	VICTORIA, TX	20.32	325.1
JUNEAU, AK	24.98	207.6	HOUSTON/WILLIAM HOBBY, TX	20.24	***
SAN ANTONIO/RANDOLPH AFB, TX	24.52	***	MILTON/WHITING NAS, FL	20.06	***
SAN ANTONIO/KELLY AFB, TX	23.23	***	LUFKIN, TX	19.83	187.6
HOUSTON, TX	23.04	218.2	CORPUS CHRISTI, TX	19.39	453.0
MCCOMB, MS	22.94	***	WACO, TX	19.19	343.3
MOBILE, AL	22.94	154.3	GALVESTON, TX	19.15	215.2
NEW ORLEANS/LAKE FRONT, LA	22.85	***			

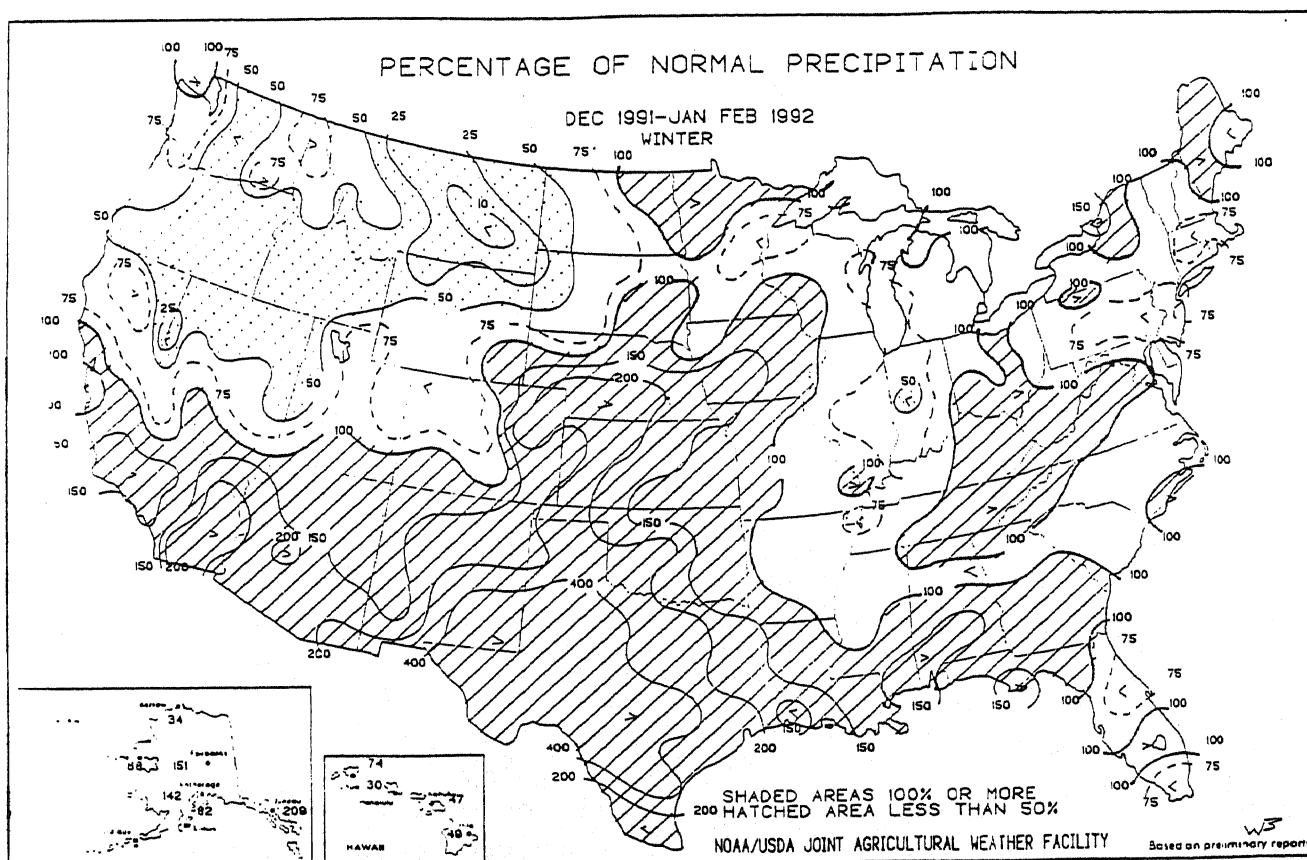
NOTE: Stations without precipitation normals are indicated by asterisks.



**FIGURE 1.** Winter (December – February) 1991 – 1992 Precipitation Percentiles. Statistically significant wetness [ $>70$  %ile] covered much of the central and southern Great Plains, the central Gulf Coast, and central and southern California while abnormally dry weather [ $<30$  %ile] was observed across the northwestern quarter of the country, parts of the lower Midwest, and portions of the Northeast. Exceptionally heavy precipitation, among the top 10% of climatological occurrences, covered much of Texas, where severe flooding was reported. In sharp contrast, equally unusual dryness was observed across southern and eastern Oregon and parts of the northern Intermountain West.

**TABLE 2. SELECTED STATIONS WITH 70% OR LESS OF THE NORMAL PRECIPITATION AND NORMAL PRECIPITATION OF 8.00 INCHES OR MORE DURING WINTER 1992.**

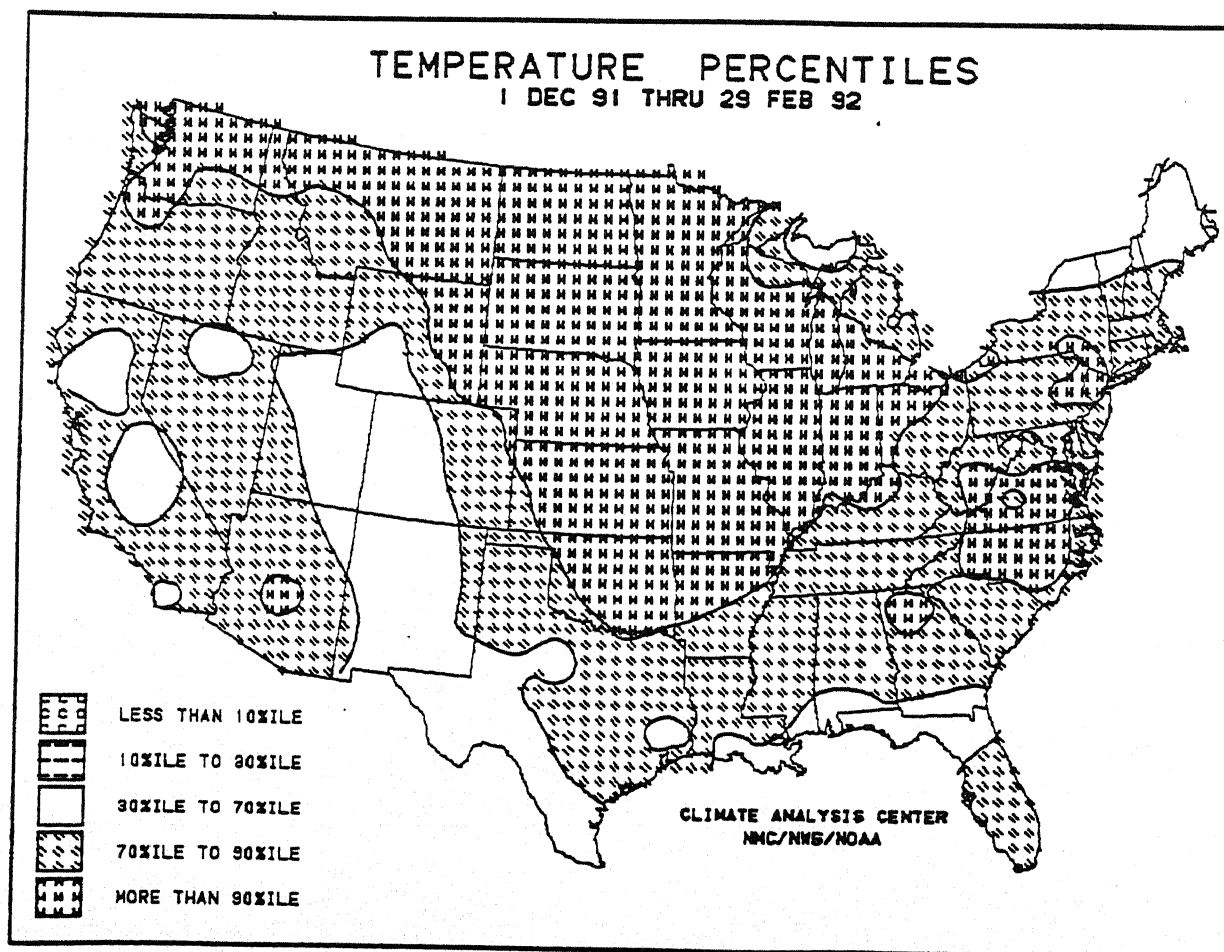
STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)	STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)
MEDFORD, OR	2.52	28.1	8.97	EVANSVILLE, IN	6.10	64.5	9.46
HONOLULU, OAHU, HI	2.99	30.3	9.88	NEW YORK/LA GUARDIA, NY	6.31	64.3	9.81
ORLANDO, FL	4.02	56.1	7.17	NEW YORK/KENNEDY, NY	6.51	66.8	9.75
INDIANAPOLIS, IN	4.02	50.0	8.04	ALLENTOWN, PA	6.73	67.1	10.03
KAHALUI, MAUI, HI	4.46	46.0	9.70	CHATHAM, MA	6.74	50.1	13.46
MUSKEGON, MI	4.52	68.8	6.57	ATLANTIC CITY, NJ	6.79	65.5	10.37
SEXTON SUMMIT, OR	4.81	27.1	17.77	HAMPTON/LANGLEY AFB, VA	6.95	66.4	10.47
SOUTH BEND, IN	5.04	68.4	7.37	DANVILLE, VA	7.01	69.3	10.11
HARRISBURG, PA	5.53	61.9	8.93	EASTPORT, ME	7.74	63.4	12.21
PHILADELPHIA, PA	6.04	64.5	9.37	WORCESTER, MA	7.76	68.5	11.33
NEWARK, NJ	6.07	63.6	9.54	BOSTON, MA	7.98	66.0	12.10



**FIGURE 2. Winter (December – February) 1991 – 1992 Percent of Normal Precipitation.** Isopleths drawn for 10%, 25%, 50%, 75%, 100%, 150%, 200%, and 400%. *Surplus winter precipitation was observed across much of the Plains and through the southern states. A large part of Texas observed over 4 times the normal seasonal totals, setting a few Winter records and generating severe flooding. In contrast, the Winter was very dry through the northern High Plains, where some locations measured under 10% of normal amounts.*

**TABLE 3. WINTER 1991–1992 AVERAGE TEMPERATURE  
9.0°F OR MORE ABOVE NORMAL.**

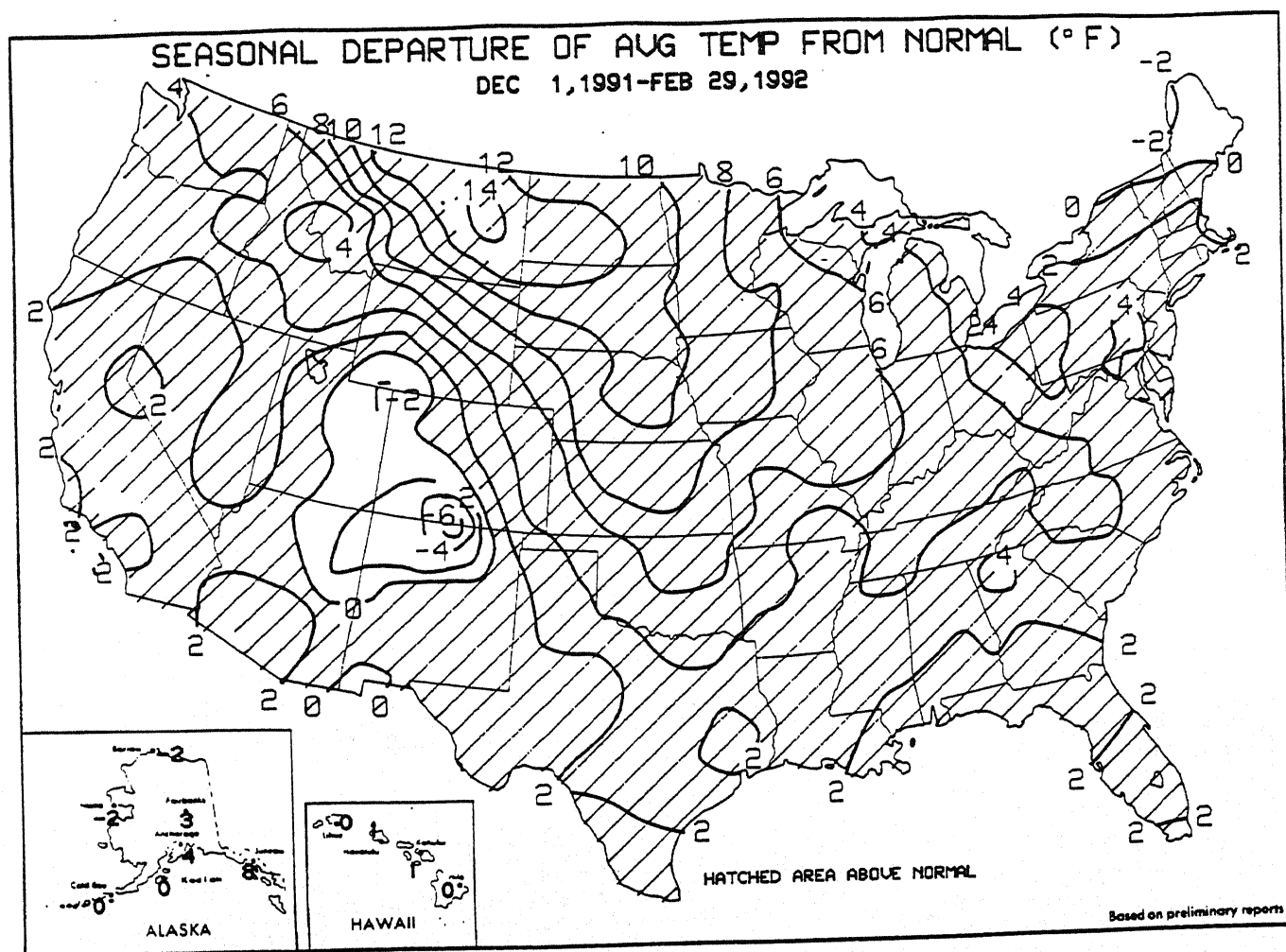
<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)	<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)
MILES CITY, MT	+14.0	33.2	PIERRE, SD	+10.7	30.2
GLASGOW, MT	+13.7	27.3	GRAND FORKS, ND	+10.6	18.1
DICKINSON, ND	+12.9	28.7	BILLINGS, MT	+10.5	36.2
BISMARCK, ND	+12.8	25.2	SIOUX CITY, IA	+10.4	31.4
CUT BANK, MT	+12.6	31.8	SIOUX FALLS, SD	+10.2	27.4
HAVRE, MT	+12.6	30.0	FARGO, ND	+10.2	19.8
MINOT, ND	+12.4	23.9	GRAND ISLAND, NE	+10.1	35.1
WILLISTON, ND	+12.0	24.7	WATERTOWN, SD	+9.8	22.8
JAMESTOWN, ND	+11.8	22.3	RAPID CITY, SD	+9.7	34.2
ABERDEEN, SD	+11.5	24.7	DEVIL'S LAKE, ND	+9.6	17.1
GREAT FALLS, MT	+11.2	35.5	ALEXANDRIA, MN	+9.3	19.9
NORFOLK, NE	+11.2	33.0	NORTH PLATTE, NE	+9.2	34.2
HURON, SD	+11.2	27.4	SALINA, KS	+9.0	40.0
LINCOLN, NE	+11.0	35.2	OMAHA, NE	+9.0	33.7
LEWISTOWN, MT	+10.7	32.8			



**FIGURE 3.** Winter (December – February) 1991 – 1992 Temperature Percentiles. Statistically significant warmth covered most of the country as the nation's mildest Winter on record (since 1895 – 96) was observed. Large sections of the Pacific Northwest, northern Intermountain West and Rockies, Plains, Midwest, and Mid-Atlantic reported very unusual warmth among the top 10% of the historical distribution of occurrences.

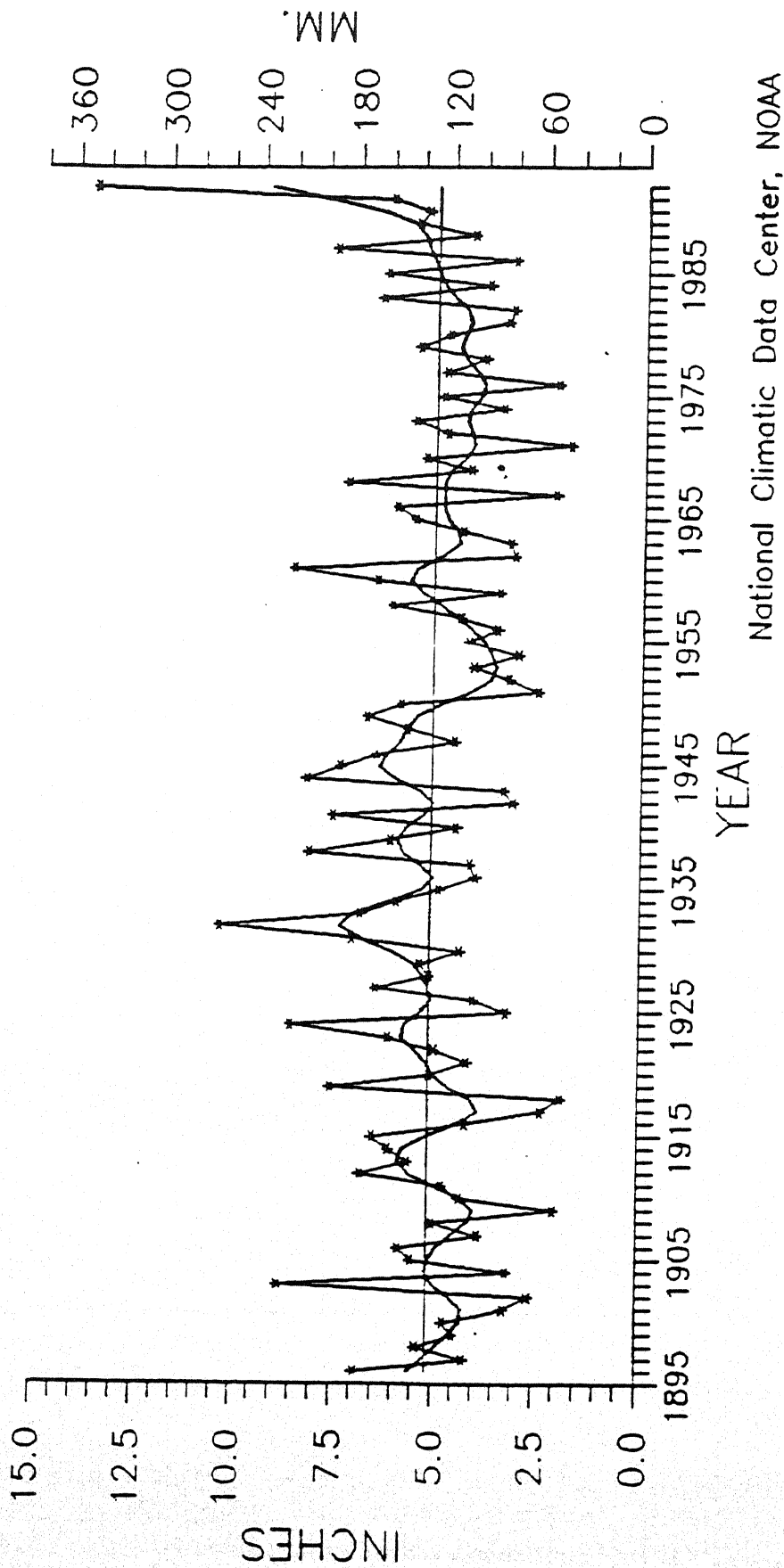
**TABLE 4. WINTER 1991 – 1992 AVERAGE TEMPERATURE  
1.0°F OR MORE BELOW NORMAL.**

<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)	<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)
ALAMOSA, CO	-12.0	6.9	WINSLOW, AZ	-2.0	32.6
BETHEL, AK	-2.7	2.8	NOME, AK	-1.8	-2.8
EASTPORT, ME	-2.7	22.3	GRAND JUNCTION, CO	-1.4	27.7
BARROW, AK	-2.4	-17.8	CARIBOU, ME	-1.3	12.0
HOULTON, ME	-2.1	12.8	BANGOR, ME	-1.0	19.4
ROCK SPRINGS, WY	-2.1	20.1			



**FIGURE 4: Winter (December – February) 1991 – 1992 Departure of Average Temperature From Normal.** Iso-  
pleths drawn for -6°F, -4°F, -2°F, 0°F, 2°F, 4°F, 6°F, 8°F, 10°F, 12°F, and 14°F. *Exceptionally mild conditions, with  
temperatures averaging 10°F to 15°F above normal, covered the northern Plains through most of the Winter. Only small  
portions of western Maine and the central Rockies reported below normal seasonal temperatures.*

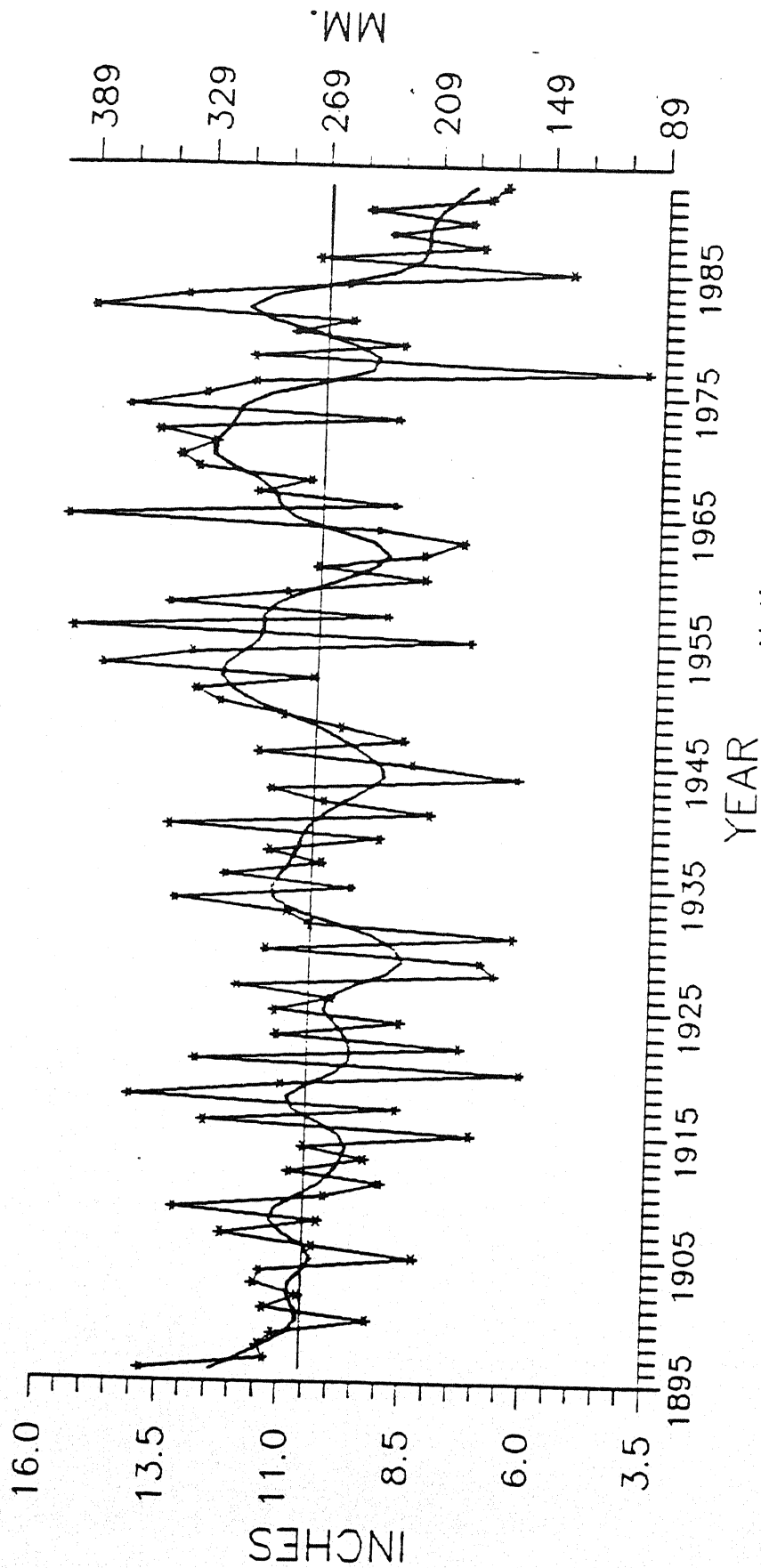
# TEXAS STATEWIDE PRECIPITATION DEC-FEB, 1895-96 to 1991-92



National Climatic Data Center, NOAA

Winter (December - February) 1991 - 1992 Texas Statewide Precipitation, as computed by the National Climatic Data Center. Inundating rains and severe flooding during December combined with sporadic more moderate to heavy precipitation during the ensuing two months to produce the highest statewide totals by far since records began in 1895 - 1896.

# NORTHWEST REGION PRECIPITATION DEC-FEB, 1895-96 to 1991-92



National Climatic Data Center, NOAA

Winter (December - February) 1991 - 1992 Northwest Regional Precipitation, as computed by the National Climatic Data Center. The Winter of 1991 - 1992 was the sixth consecutive such period to bring below normal precipitation to the region. Unlike the state of California, where the sixth consecutive drier than normal winter of 1991 - 1992 was the wettest of the series, this Winter was drier than any of the previous five in the Northwest region, bringing the long-term trend to exceptionally low levels.

Top Ten Rankings: *ITALICS* Bottom Ten Rankings: **BOLD**

**TEMPERATURE RANKINGS FOR DEC 1991– FEB 1992, BASED ON THE PERIOD 1895–96 TO 1991–92. 1 = COLDEST AND 97 = WARMEST.**

<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>
AL	68	IA	<b>97</b>	NE	<b>97</b>	RI	87
AZ	77	KS	<b>97</b>	NV	79	SC	83
AR	85	KY	<b>94</b>	NH	85	<b>SD</b>	<b>95</b>
CA	77	LA	76	NJ	82	TN	85
CO	68	ME	43	NM	39	TX	78
CT	82	MD	79	NY	73	UT	57
DE	73	MA	75	NC	86	VT	72
FL	65	MI	<b>88</b>	ND	<b>95</b>	VA	<b>90</b>
GA	77	MN	<b>95</b>	OH	<b>89</b>	WA	<b>95</b>
<b>ID</b>	<b>96</b>	MS	81	OK	<b>97</b>	WV	83
<b>IL</b>	<b>96</b>	MO	<b>96</b>	OR	<b>96</b>	WI	<b>93</b>
IN	<b>92</b>	MT	<b>97</b>	PA	84	WY	89

*National Climatic Data Center*

**PRECIPITATION RANKINGS FOR DEC 1991 – FEB 1992, BASED ON THE PERIOD 1895–96 TO 1991–92. 1 = DRIEST AND 97 = WETTEST.**

<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>
AL	85	IA	65	NE	87	RI	42
AZ	80	KS	78	NV	11	SC	33
AR	15	KY	50	NH	20	SD	30
CA	56	LA	87	NJ	25	TN	57
CO	23	ME	38	NM	<b>97</b>	<b>TX</b>	<b>97</b>
CT	22	MD	31	NY	45	UT	20
DE	34	MA	15	NC	49	VT	19
FL	49	MI	29	ND	12	VA	51
GA	48	MN	67	OH	26	WA	25
<b>ID</b>	<b>4</b>	MS	61	OK	86	WV	53
<b>IL</b>	<b>21</b>	MO	37	<b>OR</b>	<b>5</b>	WI	35
IN	13	<b>MT</b>	<b>3</b>	PA	29	WY	<b>3</b>

*National Climatic Data Center*

# **EL NIÑO/SOUTHERN OSCILLATION (ENSO)**

## **DIAGNOSTIC ADVISORY 92/03**

*issued by*

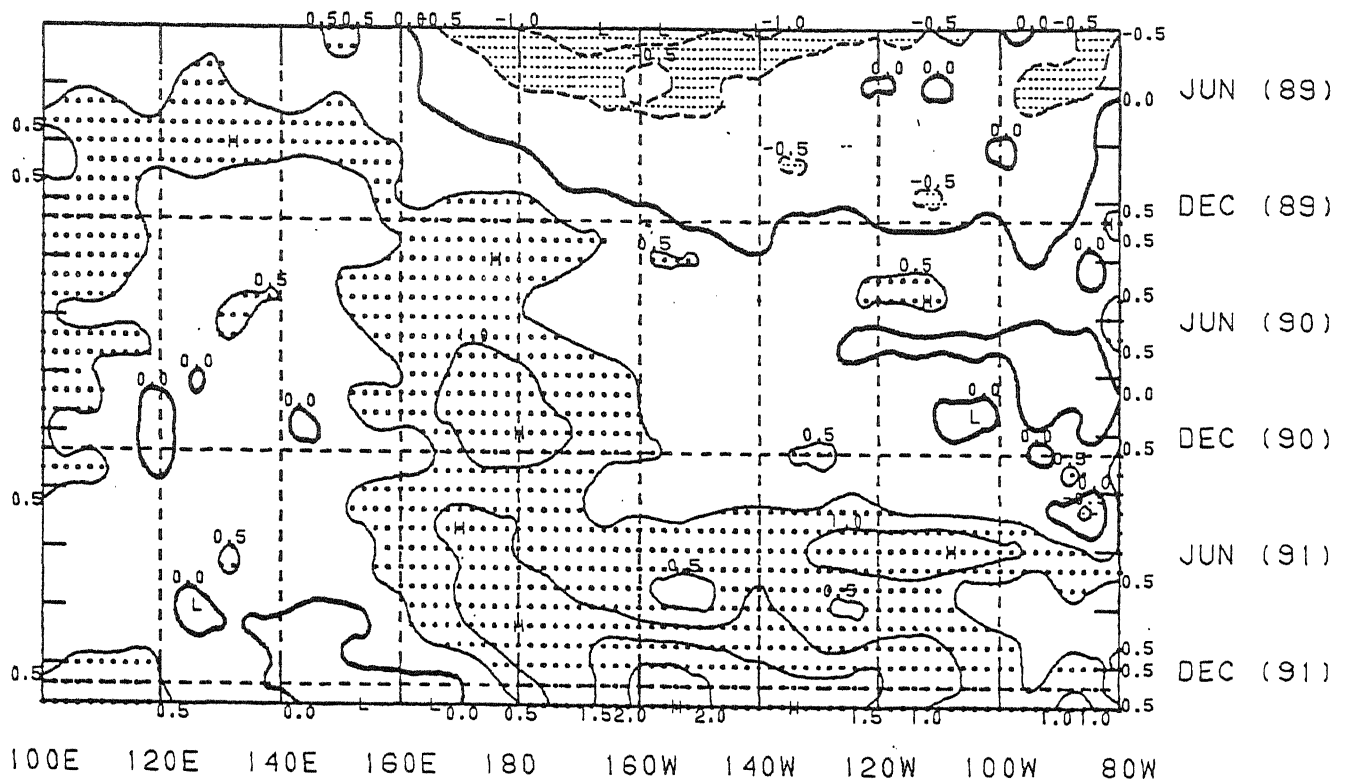
**DIAGNOSTICS BRANCH  
CLIMATE ANALYSIS CENTER, NMC**

**MARCH 11, 1992**

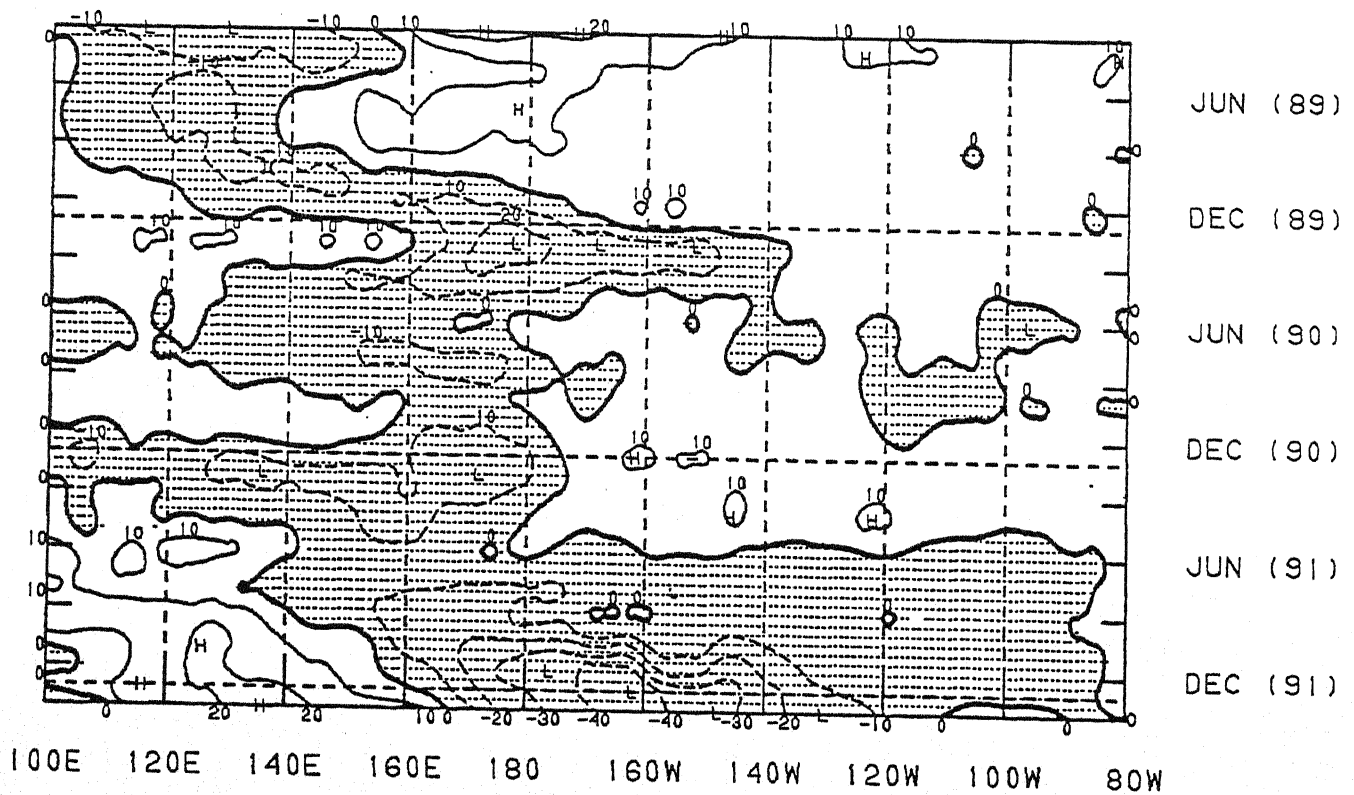
Atmospheric and oceanic indices during February were consistent in indicating mature phase warm episode conditions in the equatorial Pacific. During the last few months, oceanic thermocline depths have been greater than normal in the east and less than normal in the west as low-level easterlies remained much weaker than normal. Equatorial sea surface temperature anomalies have increased to greater than 2°C in sections of the central Pacific (Figure 1), accompanied by enhanced convection in that region (Figure 2) and a 5-month running mean value of the Southern Oscillation Index near -2 (Figure 3).

Of immediate importance is the magnitude of the warming that will be experienced along the South American coast during the next few months. By late February, sea surface temperatures had risen to 3°C to 4°C above normal and sea level was 20 cm to 30 cm above normal at coastal stations in Peru. However, convective activity has remained near normal in that region, probably reflecting the larger scale SST anomaly pattern which has only weak positive anomalies in the Niño 1+2 region (Figure 4).

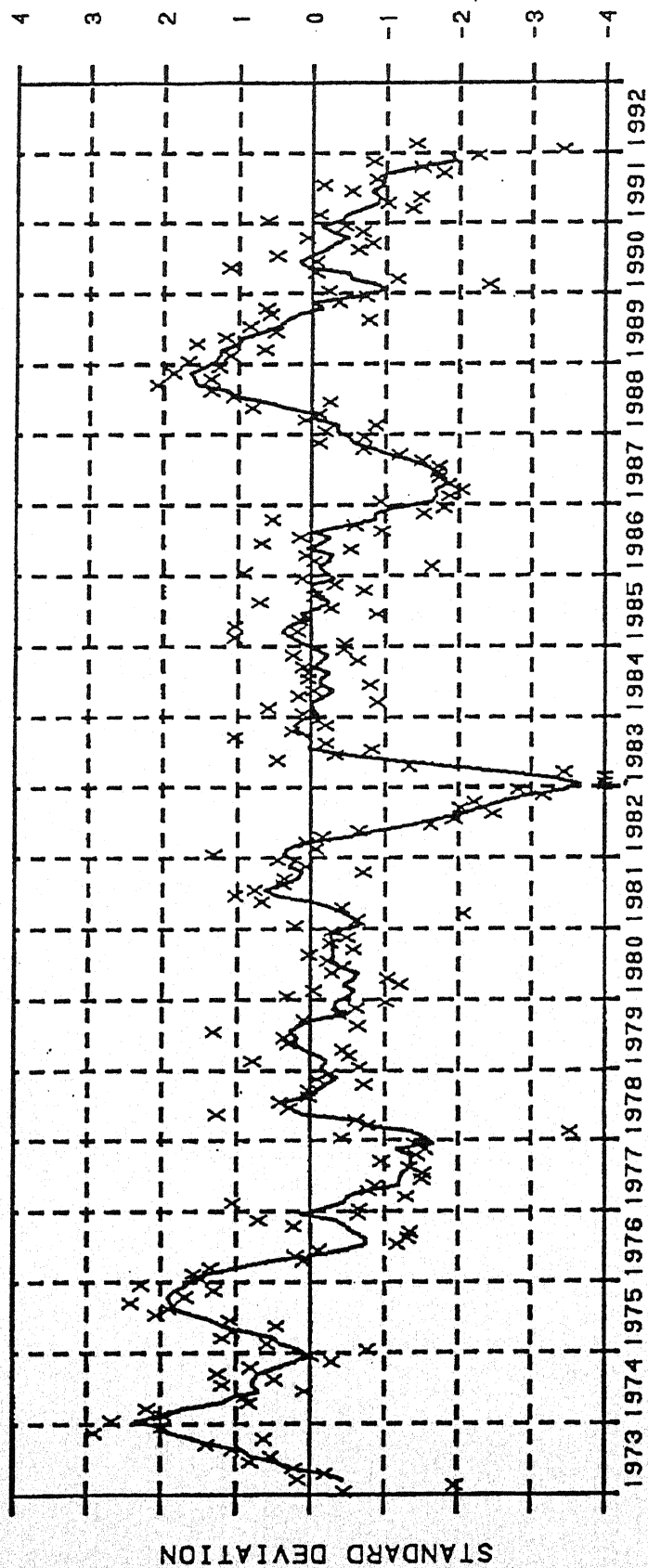
The continuation of warm episode conditions through the next six months, as indicated by statistical and numerical prediction models, may have an impact on tropical regions that normally experience their rainy seasons during that period. Areas likely to be affected include northeast Brazil, Central America, and India. These regions usually experience deficient rainfall during warm episodes. Indonesia and the Philippines, which have been experiencing below normal rainfall, are likely to see a continuation of that pattern during the next two seasons. Heavier than normal rainfall is likely over southern Brazil and northeast Argentina, as well as over the central tropical Pacific. The effects over North America normally disappear during the northern spring, with an absence of warm episode related patterns of anomalous temperature and precipitation during the late spring and summer seasons.



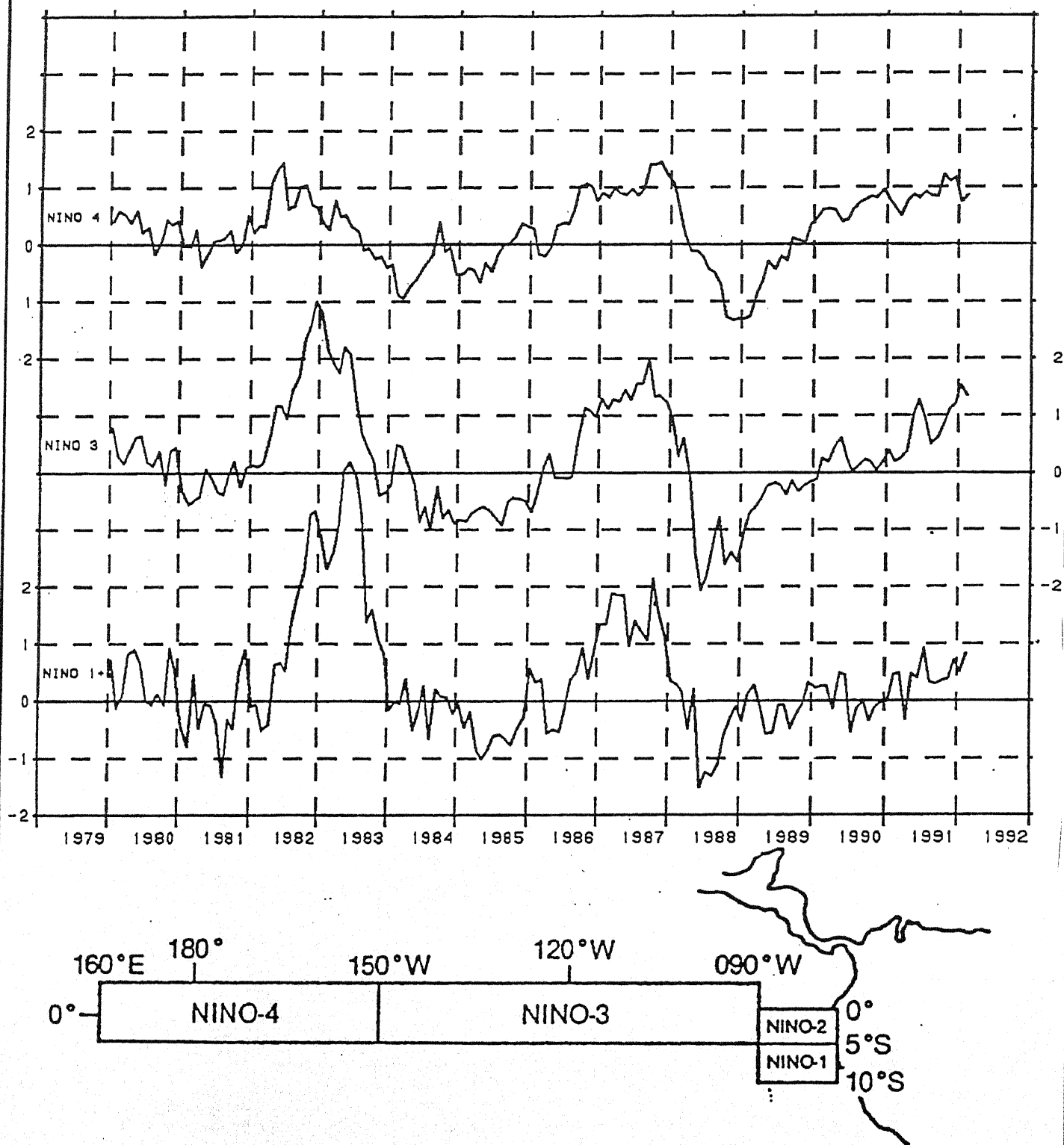
**FIGURE 1.** Time-longitude section of monthly sea surface temperature anomalies for  $5^{\circ}\text{N} - 5^{\circ}\text{S}$ . Contour interval is  $0.5^{\circ}\text{C}$ . A 1-2-1 filter in time is used on all points prior to the current month.



**FIGURE 2.** Time-longitude section of monthly outgoing longwave radiation (OLR) anomalies for  $5^{\circ}\text{N} - 5^{\circ}\text{S}$ . Contour interval is  $10 \text{ Wm}^{-2}$ . Negative values are shaded. Anomalies are computed as departures from the 1979 – 1988 base period mean.



**FIGURE 3. Five – month running mean of the Southern Oscillation Index. Individual monthly values are indicated by crosses.**



**FIGURE 4.** Equatorial Pacific sea surface temperature anomaly indices ( $^{\circ}\text{C}$ ) for the areas indicated at the bottom of the figure. Nino 1+2 is the average of the Nino 1 and Nino 2 areas.